



PROCEEDINGS

The 6th National and International
Research Conference 2023: NIRC VI 2023

“The King’s Philosophy for
Innovation and Creative Economy towards
Sustainable Development Goals in
the New Normal Era: Opportunities and Challenges”

15 February 2023

Buriram Rajabhat University



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Message from the President

Buriram Rajabhat University is an institution for local development with a major mission to produce graduates both undergraduate and graduate levels that aims to provide quality education according to academic and professional standards and create body of knowledge from researches that brings about innovations. It also plays an important role in preserving arts and culture and continuing, preserving and extending royal projects. Moreover, there is a Rajabhat University strategic operation for local development according to the royal policy of His Majesty King Rama X.

With the mission and important roles of Rajabhat University which is a university in the group of local community development or other communities (Area - based and Community), Buriram Rajabhat University; therefore, conducts projects and activities which have been integrated with various agencies both domestically and internationally. This is to drive the university towards its goals efficiently through the participation and cooperation of all parties.

The 6th National and International Research Conference under the theme “The King's Philosophy for Innovation and Creative Economy for Sustainable Development Goals in the New Normal Era: Opportunities and Challenges” is one of the important projects that Buriram Rajabhat University has continued to organized in order to make it a platform of presenting academic papers and exchanging knowledge among researchers both domestically and internationally. The knowledge gained from the conference can be further extended to benefit the stable and sustainable development of local communities, society and the nation. This conference is supported by Office of the Higher Education Commission (OHEC), Knowledge Network Institute of Thailand (KNIT), Council of the Graduate Studies Administrators of Thailand (CGAT), Council of Deans of Faculty of Humanities and Social Sciences in Rajabhat University (CF HSD RUT), Public Administration Association of Thailand (PAAT), Guidance Association of Thailand, Association of Professional Development of Educational Administration of Thailand (APDEAT) and the foreign institutes under MOU with Buriram Rajabhat University.

The Graduate School has been assigned by the university to be the main agency in organizing the conference together with Faculty of Humanities and Social Sciences, Faculty of Education, Faculty of Science, Faculty of Management Sciences, Faculty of Industrial Technology, Faculty of Agricultural Technology, Faculty of Nursing, Research and Development Institute, and the Office of International Relations.

On behalf of Buriram Rajabhat University, I would like to warmly welcome experts, faculty members, academicians, researchers, students and attendees of the conference, both Thai and foreigners with great pleasure. I hope that the 6th National and International Research Conference will benefit everyone who attends. Finally, thank you to every participant of the conference. I wish this conference a success in all objectives.

Associate Professor Malinee Chutopama
President of Buriram Rajabhat University



**The 6th National and International Research Conference 2023:
NIRC VI 2022**

**“The King’s Philosophy for Innovation and Creative Economy
towards Sustainable Development Goals in the New Normal Era:
Opportunities and Challenges”**

Date: 15 February 2023

Venue: Buriram Rajabhat University

Rationale

Buriram Rajabhat University (BRU), a higher education institute for developing the local area, has got missions to produce graduates, to manage education quality in accordance with academic and professional standard, and to build knowledge from research works, innovation and creative works to develop the local area for 50 years. From this year onwards, BRU, categorized in the third group as an area-based and Community University, is ready to allocate budget to support the re-inventing university projects, and also prepares to be ranked by the Times Higher Education (THE) as a university promoting the sustainable development goals. To achieve the aforementioned missions, BRU holds the 6th National and International Research Conference 2023: NIRC VI 2023 on 15 February 2023 at Buriram Rajabhat University, Muang District, Buriram Province, Thailand. The conference theme is on “The King’s Philosophy for Innovation and Creative Economy towards Sustainable Development Goals in the New Normal Era: Opportunities and Challenges.” This conference gives an opportunity to organizations, researchers, scholars and those who are interested both from Thailand and foreign countries to present their research works, and to share creative works and innovations. In addition, they will have the opportunity to join the academic seminars, share opinions, publicize the research works as well as exchange experience. The conference objectives are as follows:

1. To give an opportunity to lecturers, researchers, students of Rajabhat Universities and other educational institutes both in Thailand and foreign countries by presenting their quality research works and sharing experiences relevant to sustainable development;
2. To publicize the research works, creative and innovative works of lecturers, personnel, students and researchers of Rajabhat Universities and other educational institutes both from Thailand and foreign countries;
3. To promote learning activities through the development of quality and standard research works, creative and innovative works of lecturers, personnel, students and researchers of Rajabhat Universities and other educational institutes both from Thailand and foreign countries in order to utilize these works for sustainable and prosperous development of the local area, community, society and nation;
4. To connect the quality research works of Thailand and foreign countries to the target users on the aspects of academic, policy, social issues and community both from Thailand and foreign countries.



Types of the Conference

1. Academic Conference

1.1 Keynote address by national and international scholars
1.2 Presentation of national research works or academic articles (On-site) and international research or academic articles (Online and On-site)

1.2.1 Oral Presentation

1.2.2 Poster Presentation

The themes of research works or academic articles are based on the following disciplines:

- 1) Education
- 2) Humanities and Social Sciences
- 3) Science and Technology
- 4) Health Science
- 5) Business Administration
- 6) Area-based Research

1.3 Presentation of exhibition (On-site), the participants must strictly follow the prevention measures of the COVID-19 pandemic.

Co-host Organizations

The co-hosts of the conference are as follows: Office of the Higher Education Commission (OHEC), Knowledge Network Institute of Thailand (KNIT), Council of the Graduate Studies Administrators of Thailand (CGAT), Council of Deans of Faculty of Humanities and Social Sciences in Rajabhat University, Guidance Association of Thailand, and Association of Professional Development of Educational Administration of Thailand (APDEAT). The foreign institutes signed MOU with Buriram Rajabhat University are also the conference co-hosts as follows:

1. Niagara University, U.S.A.
2. Manipur University, India
3. Institute of Advanced Studies in English, India
4. Akdeniz University, Turkey
5. Changzhou University, China
6. Beijing Silkroad Xinyu Cultural Exchange Center, China
7. National Pingtung University (NPTU), Taiwan
8. University of Northern Philippines, the Philippines
9. Philippine State College of Aeronautics, the Philippines
10. Hue University College of Foreign Languages, Vietnam
11. Pattimura University, Indonesia
12. Mandalay University of Distance Education (MUDE), Myanmar
13. University of Myitkyina, Myanmar
14. University of Pakokku, Myanmar
15. University of Mawlamyine, Myanmar
16. University of Maubin, Myanmar
17. Savannkhet Teacher Training College (STTC), Lao PDR
18. Royal University of Phnom Penh, Cambodia
19. Middle Tennessee State University, USA
20. Istanbul University, Turkey



Expected Outcomes

1. There are at least 150 lecturers, researchers, students and those who are interested join the conference. There will be at least 80 national research papers and 30 international research papers. The participants will gain knowledge utilized in developing research, academic works and life quality. Also, there will be cooperation among Rajabhat Universities and Educational networks both in Thailand and foreign countries.

2. The research works, creative and innovative products can be utilized to develop the country.

3. The quality research works can be publicized in online proceedings.

Conference Organizers

Graduate School, Faculty of Humanities and Social Sciences, Faculty of Education, Faculty of Agricultural Technology, Faculty of Science, Faculty of Industrial Technology, Faculty of Management Sciences, Faculty of Nursing, Office of International Relation Affairs, and Institute of Research and Development of Buriram Rajabhat University.



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**The 6th National and International Research
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Featured Speaker



A Word to the Wise: Managing Your Mental Health as an Adult Student in the New Normal

David D. Perrodin

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Abstract

Many adults who aspire to develop a more meaningful career path decide to pursue an advanced degree in their chosen field. Surprisingly, in addition to the knowledge and personal growth that one expects from such an academic journey, embarking on an emotionally, financially, and mentally consuming four- to seven-year tertiary program is, in a word, daunting. Studies have shown that the burden on the mental health of adult students in an already overwhelming academic program is often more than they bargained for. In this study, the challenges and paradoxical issues that adult students face in pursuing advanced degrees were ascertained by utilizing content analysis of in-depth interviews with adult graduate and postgraduate students. It was discovered that mental health challenges for adult students predominantly revolve around interaction with their supervisors, overall time management, agonizing self-doubt, and utter dread. Moreover, when considering the new landscape of learning that emerged in the wake of the COVID-19 pandemic, the most common issue of late is the feeling of isolation. Regardless of a global pandemic that has devastated and continues to overwhelm the world, to alleviate the anxiety of feeling isolated by adult graduate and postgraduate students, group cohesiveness and a feeling of belonging within a community of practice must be encouraged within tertiary programs.



Role of Language in Attaining Sustainable Development Goals

Dr.Irom Gambhir Singh

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Abstract

Inter-communication has become pertinent more than ever in our globalized world. In order to foster and encourage global citizenship and a sustainable world, society needs to view multilingualism as normal and desirable, and government, educators, and the private sector need to work together to develop the learning opportunities, accessible to all. Conflicts in language selection for the medium of instruction, deciding on the place of mother tongue and global language, etc are some obvious issues in the multilingual and multicultural education scenario. Embracing a global multilingual approach could be a sensible step to bring linguistic and cultural equity and therefore sustainable development resultantly. Whatever the case, it has been observed that language will play a significant role in virtually achieving major sustainable development goals - from quality education to ending poverty, reduced inequality to industry and innovation as well as revitalisation of global partnership. Therefore, the central objective of this paper is to deliberate on the significance of language essential in the realization of sustainable development goals.

Keywords: Globalized world, Language, multilingualism, sustainable development goals, global partnership



Integrating Global Issues in the Creative English Language Classroom

Professor Ni Ni Hlaing

Myanmar

Abstract

“Global education” is a new approach to language teaching which aims to enable students to successfully acquire a foreign language while nurturing them with the knowledge, skills, and responsibility required by world citizens to solve global problems. Global educators highlight that global education is a pedagogical approach, not just a new “teaching technique,” and usually assign peace, human rights, development, and the environment as the four content areas of global education. Our world faces severe global issues of violence, ethnic conflict, social inequality, and environmental destructions. Teaching is not all about how to make students learn the subject and get high scores. It is also an effort to make a better world and to drive students to be much better citizens for the globe. Seeing the current condition of the world, educators should show their social responsibilities to build it and to solve the global challenges as well as to use education to promote peace and mutual understanding among people and nations. This turns to be a challenge for all educators including English language educators to transform their teaching and learning process into a process which does not only focus on preparing students to be successful learners of the target language or proficient speakers of certain languages. More than that, English teachers should be able to equip students to be more understanding and showing more respect to their surroundings. So, this talk aims at explaining how to integrate education which focuses on global issues and problems into English language teaching. It also suggested that teaching materials for global education, content integration, teaching methods, extracurricular activities for global education and global education teacher training are the factors to be considered for English teachers in this global era.

Keywords: Global education, English language teaching, Global issues



Creating a Professional Development School Partnership to Assist English Language Learners in Thailand

Michael Smith

Niagara University, New York, USA

Abstract

The purpose of this case study is fourfold; 1. to introduce the reader to the innovative Bamboo School Model of Education; 2. to provide an overview of the Professional Development School model and its numerous benefits for public and private education; 3. to highlight the importance of integrating the 17 Sustainability Development Goals in a constructivist, global school curriculum; and 4. to develop a professional development school partnership model in Thailand to facilitate the acquisition of the English language and embrace the Sustainability Development Goals of the United Nations. In this study, I propose a model that focuses on a collaborative constructivist effort involving Buriram Rajabhat University and the Bamboo School in Thailand. The Buriram Bamboo School (BBS) was selected because of its innovative and constructivist philosophy, and the fact that it currently offers a number of English courses for high school students. Buriram Rajabhat University (BRU) was chosen for its proximity to the BBS, its forward-thinking faculty and administration, and its Bachelor of English Education and Masters of Education in English Language Teaching (ELT) programs. This proposed model could also be piloted in education systems throughout the world in an effort to integrate a heightened constructivist philosophy within a PDS model that focuses on the SDGs and English Language Learners.

Keywords: Buriram Bamboo School (BBS), English language learners (ELLs), Professional Development Schools (PDSs), Sustainability Development Goals (SDGs)



Role of Environmental Awareness and Perception in Local Sustainable Development

Professor Dr. Saw Pyone Naing and Khin Ohnmar Htwe

Abstract

According to UNESCO, 2015, "Education can, and must, contribute to a new vision of sustainable global development." To create a more sustainable world and to engage with sustainability-related issues as described in the SDGs, individuals must become sustainability change-makers. They require the knowledge, skills, values and attitudes that empower them to contribute to sustainable development. Education is crucial for the achievement of sustainable development. The approach of Education for Sustainable Development (ESD), established by UNESCO, empowers learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society for present and future generations. This paper aims to highlight the role and objectives of ESD and its requirement in the local people's knowledge on SDGs. The results of the research projects showed that the awareness of the local people was primarily related to their perceptions. The study focused on the facts and perceptions of rural people, governmental staffs and local travelers with special emphasis on Inle Lake which is one of the tourist attractions and Ramsar sites of Myanmar. The study found that environmental management and economic sustainability in this area is interdependent between facts and perceptions of the local people and their ability to use traditional methods for maintaining intimate physical and human environment. It is also relevant to ESD's aims at developing competencies that empower individuals to reflect on their own actions, taking into account their current and future social, cultural, economic and environmental impacts, from a local and global perspective. This paper, therefore, tried to highlight the importance of environmental education and Education for Sustainable Development that could empower people's facts and perception.

Keywords: Environmental Awareness,
Environmental Education,
Environmental Perception,
Education for Sustainable Development (ESD),
Sustainable Development Goals (SDGs)



A Comparative Study of Physicochemical Properties, Some Bioactivities of *Syzygium aromaticum* L. (Clove Buds) and Chemical Composition of Clove Buds Oil from Kyunsu (Tinintharyi Region, Myanmar) and India

Ni Ni Oo

Maubin University, Ministry of Education, Myanmar

Abstract

Cloves (*Syzygium aromaticum* (L.) Merr & Perry) is one of the plant species in the genus *Syzygium* which is one of the well know traditional medicinal in the world. Clove buds were chosen for this research which was conducted in order to compare between two different growth area from Kyunsu Township, Tanintharyi Region, Myanmar, and India (Myanmar market). The aim of this study was to assess physicochemical properties, antimicrobial activity, and in-vitro antioxidant activity and chemical composition of two sample clove bud oil. The present research work was designated to screen for physicochemical properties and to investigate some biological activities such as antioxidant and antimicrobial of the two sample Clove buds. As a preliminary phytochemical screening of the clove buds, alkaloids, α -amino acids, flavonoids, carbohydrates, phenolic compounds, glycosides, tannins, starch, saponins, steroids, and terpenoids were found, but reducing sugar and cyanogenic glycosides were not found by the test-tube method. According to EDXRF, the high mineral contents of calcium, potassium, and iron were present in the Clove buds. The results of the determination of nutritional values were obtained as moisture (16.15 & 17.41 %), ash (6.50 & 5.05 %), fibers (9.69 & 8.74 %), fats (7.63 & 8.05 %), proteins (16.83 & 17.94 %), and carbohydrates (43.20 & 42.81 %) in the dried powder samples (India and Kyun-Su). Ethanol extracts of two samples (India and Kyun-Su) showed significant antioxidant activity ($IC_{50} = 17.93$ & 14.66 mg/mL). The watery and ethanol extracts showed higher antimicrobial activity than ethyl acetate extract against six microorganisms by the agar well diffusion method. From the resultant data, two sample clove buds contain valuable and some bioactive phytochemical

compounds, essential elements, and health-beneficial nutrients. The present investigation, the growth the Myanmar' clove bud is fresh, high nutritional value and more potent antioxidant activity.

Keyword: Clove, physicochemical properties, Antioxidant activity, chemical composition



HOW DO WE UTILIZE BIG DATA MINING IN BIOLOGICAL SCIENCES?

Ömür BAYSAL

Abstract

From the beginning of sequencing and mapping technology, genetic material of various macro/microorganisms has been explored to understand the functional genes and their roles. To increase the capacity of genomic studies, Next Generation Sequencing (NGS) technology has accelerated the measurable scale at whole genome level that makes it possible to obtain data ascribed as petabytes. These technologies resulted in data accumulation of which analysis is not possible without using certain algorithms and the rules based on computational technology. Therefore, big data has met the requirements sourced from data management and evaluation using computational technologies. Omics science technologies involving major fields; genomics, transcriptomics, proteomics, and metabolomics have led to data yielding depending on molecular measurements obtained from wet lab studies. No longer we have no problem in providing data; however, we face with difficulties due in choosing valuable data which will be classified as an output that can be correlated with previous findings considering biological cases and logic. For instance, one might perform genomics studies or transcriptomics data by NGS but if the researcher has no background on its biological property that limits interpretation of available data associated with omics science technology. The rational data by NGS could not be evaluated alone if it is not supported with the findings observed in vivo/vitro conditions. Nevertheless, this case depends on target micro/macro-organisms and bio-safety conditions, which are necessary to conduct wet lab studies. In these circumstances threatening health, we use predictive methods and modelling which enable us to save the cost of time and money. Using computational technologies, animating any reaction between a target receptor and molecule could provide information before wet lab processes that would be adjusted depending on users' preference and designed trials. The advantages of these technologies could be used for testing any molecule on desired problems related to the biological system waiting answer for the solution in order to provide sustainable approach on essential fields related to agriculture, environmental sciences and medicine. In this concept, this presentation overviews on data mining and its exploitation fields in biological science, which may motivate junior researchers for further studies.

Keywords: Omics Science, Big Data, Data Mining, NGS



EFL Teachers' Hegemony in Classroom Assessments: Conflict between Context and Curriculum in Bangladesh

**Sree Bidhan Chakraborty
Dr. Himadri Sekhar Roy**

Abstract

English teachers' hegemony in the classroom assessment is a must to ensure effective teaching-learning activities in the academia. However, it is revealed in many studies that English teachers' lack of hegemony never let them instigate appropriate approaches both in teaching-learning activities and assessment. This study, emphasizing the conflict between context and curriculum, tried to discover English teachers' perception on classroom assessments in the English as Foreign Language (EFL) context. Moreover, this research incorporated a qualitative design in a view to bring the details from the respondents. 10 tertiary level English teachers and 10 students from different universities, both public and private, of Sylhet, a divisional city of Bangladesh where English is taught as an EFL, were interviewed as well as the details of their teaching curriculum were analysed to bring the insight on how the conflict between teaching context and prescribed curriculum created hindrance on ensuring teachers' hegemony in the classroom assessment. This study came up with some significant findings regarding the teachers' challenges of using appropriate assessments in their academia due to the gaps between designed curriculum and their persistent context. It was revealed that none of the teachers had the hegemony of using teaching materials that they felt needed for assessment. The study also discovered that the gap between the prescribed curriculum and the learners' learning context created a bizarre in the total assessment process as the prescribed curriculum in many cases resist the teachers from using the updated and authentic approaches based on the learners' learning environment thus ended with a weird evaluation system.

Key Words: EFL, Hegemony, Assessment, Curriculum, Context



Post-Covid Challenges and Solutions of Web-Based Education on the Learners' Experiences: A Cognitive Psychological Approach

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Abstract

The current phenomena of remote (online) education have left the instructors feeling 'out of space'. As the setting for both physical presence and disciplinary gaze is shifted or better cancelled for most cases in online classrooms. The balance of power has been shifted in favour of the students. In this talk, I claim the hierarchy structure of the virtual space has developed into confusion and power struggle in teacher-student relationship in the virtual space (Elyas & Baslmash, 2015; Oraif, & Elyas, 2021). Although it is tempting to believe that simply providing the latest technology and multimedia will 'supposedly' motivate learners to flock to online learning sites, this is not necessarily the case. Hall writes that the level of multimedia use in Web-based training should be determined by the program design needs, not just by a desire to use the latest technology. Findings show that when students are able to see a practical application of the knowledge, they are more motivated and they can more easily merge the new information with their previous experiences (Al-Bogami & Elyas, 2020). Simulations can also provide valuable experience in applying new knowledge, either to contribute to the learning process or as an assessment of the learner's understanding.

Keywords: Learning Sites, Online Education, Simulation, Student-Centred.



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Efficiency of Using Understanding by Design Lesson Planning Model for Teaching English to Grade Four Students in Beungxang Secondary School, Savannakhet Province, Laos

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Abstract

This research aims at evaluating the efficiency of Understanding by Design (UbD) lesson planning model which was used by four pre-service teachers to teach English to 62 grade four students in Beungxang secondary school, Laos. The efficiency of UbD lesson plans was shown by results of learning (E1/E2) or the estimation of 75/75, which was collected by using six pretests and a posttest. Moreover, pre-service teachers' 12 observation notes and semi-structured interviews were applied in order to collect information on satisfaction on using the UbD model, good points, difficulties as well as suggestions for improvement. The findings showed that pre-service teachers had some difficulties, such as confusion about what to put in the topics in the first and second stage of UbD lesson plan and misunderstanding how to adapt content of existing tasks in a lesson to match students' needs and learning environment. The misunderstanding of the goal of the lesson in the first stage and the evidence to achieve in the second stage in UbD made pre-service teachers feel unconfident when teaching and incompetence in adapting the existing contents result in-service teacher's incomplete all teaching tasks in each lesson. Therefore, they suggested that the teacher trainer had to train adaptation techniques and to clarify the meaning of each topic in the first and second stage of the UbD lesson planning model.

Keywords: Efficiency, difficulties, UbD lesson planning model, secondary school, pre-service teachers, long teaching practice

1. INTRODUCTION

Lesson plan is a structure for a lesson, a 'map' for the teacher to follow and a record of what has been taught" (Richards (1998). Having a lesson plan helps teachers to think about content, materials, sequences, time, and activities and to take over a class when the teacher cannot teach (Purgason, 1991). Therefore, different types of lesson planning models such as dominant model of lesson planning (Tyler 1949), which called rational-linear framework, an alternative model (Yinger, 1980), sequencing model (Richards & Lockhart, 1994), a dynamic processing model (Freeman 1996; Bailey, 1996), stimulating model (Shrum and Glisan, 1994), Sheltered Instruction Observation Protocol (SIOP) model (Echevarria et al, 2007), presentation, practice, and production (three Ps) model that was used by many educationalists for teaching English for communication (Brumfit, 1979; Byrne, 1986; Harmer, 2001, 2007; Hedge, 2000; Scrivener, 1994;



Skehan, 1998; Tomlinson, 2011; Willis, 1996; Ritchie, 2003; Tang, 2010; Hellström, 2015; Maftoon & Sarem, 2015; Anderson, J. 2016) and Understanding by Design (UbD) (Wiggins & McTighe, 2011). However, when these models have been trained for pre-service teachers in teacher training institutions in Laos, specifically English teacher training programs they are called different names such as: three columned lesson plan, five columned lesson plan, seven columned lesson plan, check list lesson plan, three Ps lesson plan, UbD lesson plan, and lesson plans for teaching language skills, and only UbD lesson planning model is selected to use in Savannakhet province in the middle part of Laos.

UbD is a backward design model that prepares teachers with deep insights of preparing activities backward. Table 1 shows the UbD lesson planning model and the guiding questions for teachers to use.

Table 1
UbD lesson planning model with guiding questions

Stage1- Desired results	
Established goals: What relevant goals (e.g., content standards, course/program objectives, learning outcomes) will this design address?	
Understanding: students will understand that... What are the big ideas? What specific understandings are desired? What understanding are predictable?	Essential questions: What provocative questions will foster inquiry, understanding, and transfer of learning?
Knowledge: students will know... What key knowledge will students acquire as the result of learning this lesson?	Skills: students will be able to... What key skills will students acquire as the result of learning this lesson?
Stage 2- Assessment evidence	
Performance tasks: Through what authentic performance tasks will students demonstrate to achieve the skills? By what criteria will performances be judged?	Other evidences: Through other evidence (e.g., quizzes, tests, journals...) How will students reflect upon and self-assess their learning?
Stage3- Learning plan	
Learning activities: What learning experiences and instruction will enable students to achieve the desired results? How will the design W= help students to know where the unit is going? And what expected? Help teachers know where students are coming from (prior knowledge, interests)? H= Hook all students and hold on interest? E= Equip students, help them experience the key ideas and explore the issues? R= Provide opportunities to rethink and revise their understanding and work? E= Allow students to evaluate their work and its implications ?	



T= Be **tailored** (personalized) to different needs, interests, and abilities of learners?
O= Be **organized** to maximize initial and sustained engagement as well as effective learning?

The UbD lesson planning model consists of three stages, which starts from (1) **clarifying goals/desired results**: this stage consists of four subtitles, such as *Understanding* which focuses on what enduring understandings are desired? *Significant questions* which focus on what essential questions will be explored in-depth and provide focus to all learning? *Knowledge* which focuses on what key knowledge do students have to achieve? *Skills* which focus on what skills will they achieve at the end of learning/practicing? (2) **Assessment Evidence**: this stage consists of two subtitles, such as *performance tasks* which focuses on what tasks do students need to practice in order to achieve the knowledge and skills? *other evidence* which focuses on what other evidence will students demonstrate in order to show the achievement results. (3) **Learning plans**: the plan can be designed by using any lesson planning model. For this stage, seven columned lesson planning models are selected to use in Savannakhet province. The seven columned lesson plan consists of seven columns with seven titles such as desired learning outcomes, contents, teacher activities, student activities, teaching materials, time and assessment/evidences that teachers need to fill in when preparing activities to teach as it has been shown in table 2 below:

Table 2
Seven lesson planning model used stage 3 in UbD lesson plan in Savannakhet province, Laos

<i>Stage</i>	<i>Learning outcomes</i>	<i>Contents</i>	<i>Teacher activities</i>	<i>Student activities</i>	<i>Teaching materials</i>	<i>Time</i>	<i>Assessment evidences</i>

Although the UbD lesson planning model has been used for a long time in Savannakhet province, results of using it have never been studied to reveal its suitability and although the UbD lesson planning model has been used for teaching different subjects in schools in Savannakhet province for a long time, efficiency, facilities, difficulties, good points, weak points as well as the learning outcomes have never been studied. Moreover, it would be useful if teacher trainers in STTC know the difficulties of using UbD for teaching, since he/she can use them as elements that need to be solved in order to improve the quality of training. Therefore, the teacher trainer (researcher) decided to conduct research in order to find out efficiency of using UbD, specifically the results of using UbD lesson plans, satisfaction of UbD users like pre-service teachers, good points, difficulties.

2. RESEARCH PURPOSES



This research has two main purposes:

1) To evaluate efficiency of using the UbD lesson planning model for teaching English including the results of learning and satisfaction of pre-service teachers toward the model.

2) To clarify good points, weak points/difficulties found as well as the suggestions for improving it.

3. METHOD

3.1 Research design

To achieve research purposes, both quantitative and qualitative data was collected. The quantitative data was collected by using tests during the time of using the lesson plans for teaching and at the end of time of long teaching practice (week eight), and the qualitative data, especially the facilities, difficulties as well as the suggestions of using the model was collected by using pre-service teachers' observation notes and interviews. Therefore, this research is action research that uses a mixed research method.

3.2 Research population and samples

The research was conducted by a teacher trainer (researcher) who trained the lesson planning model to eight pre-service teachers in Savannakhet Teacher Training College. While training, the pre-service teachers only used the model for teaching English to their classmates (demonstration), they had not used it in the actual situation like in secondary schools. After learning the model, only four of pre-service teachers were sent to Beungxang Secondary School, Savannakhet province where UbD has been used for teaching English, and then they used the UbD model for teaching 62 grade four students of two classrooms when they had long teaching practice. Therefore, the research population was four pre-service teachers (two women) and 62 students. The four pre-service teachers were not only the research participants who would be interviewed by the teacher trainer, they were the insider researchers who used UbD lesson plans and tested learning results after using them. These research participants were selected by using the necessary method because only four pre-service teachers used UbD lesson plans for teaching 62 students in two classrooms.

3.3 Research instruments

Three types of research instruments were used to collect the data: tests (pre and posttests), pre-service teachers' observation notes and semi-structured interviews.

Tests: six pre-tests and a posttest were used to assess the learning results. The tests assess language knowledge (grammar and vocabulary) and four language skills (reading, writing, listening and speaking). The total score of each test is 30, in which five is for vocabulary, five is for grammar and five is for each language skill. The six pre-tests are formative tests that were used to assess the results of learning each lesson (six lessons). In pre-tests, listening and speaking were assessed while learning. The language knowledge such as grammar and vocabulary as well as reading and writing skills were assessed at the end of each



lesson. The posttest is a summative test that was used to assess ending learning results of the two units, which were taught within the long teaching practice

period. The posttest is a paper test that includes tasks to assess ability on using grammar, vocabulary, reading, listening and writing skills, but the speaking test was conducted differently. The tests' results were reported when pre-service teachers returned to TTC.

Pre-service teachers' observation notes: pre-service teachers' observation note was suggested to be used to observe both teacher and students' actions during the teaching period. The note does not only record the behaviors of teachers and students, the satisfactions, good points, weak points (difficulties) and some ideas or comments and suggestions to improve the lesson plan. All of these points were summarized at the end of discussion and checked by the pairs after teaching or the discussion. The note was used for every lesson within three periods of learning time (six observation notes per classroom, so twelve observation notes in total).

Semi-structured interview: The interview was used for interviewing the four pre-service teachers after they were back from long teaching practice. The purposes of interviewing were for collecting the information on satisfaction of using UbD, lessons learnt when using it, good points, difficulties or problems occurred when using it and suggestions for improving it. The interviews were conducted in pairs by the teacher trainer or the main researcher. The interview took fifteen minutes. While interviewing, the information was recorded, and some focus points were taken note.

3.4 Data collection

The data were collected along the research process. The pre-test was used to assess content knowledge and language skills at the end or during the learning lesson. The pre-service teachers' observation note was used for observing both teacher and students' behaviors, good points, weak points (difficulties) during the teaching period by one of the pre-service teachers (one taught, one observed). Moreover, some ideas or comments and suggestions to improve the lesson plan were discussed and written down in the observation notes at the end of each lesson. The posttest was conducted once at the nearly end of the long teaching practice (week seventh). The test's results were checked by two pre-service teachers who taught together. And the interviews were conducted when pre-service teachers returned to STTC.

3.5 Data analysis

The quantitative data was analyzed by using descriptive statistics to clarify mean and percentage. And to reveal the efficiency of the UbD lesson plan, the formula of $E.I = \frac{p^2 - p_1}{Total - p_1}$ was applied. The qualitative data from the interviews and observation notes was analyzed by using content analysis and then the data was summarized, grouped, ranked, and prepared to present.

4. Findings

Two main results are presented in accordance with research's purposes:

1) The efficiency of using the UbD lesson planning model for teaching English including the results of learning and satisfaction of pre-service teachers toward the model.



2) The good points, weak points/difficulties as well as the suggestions found.

4.1 Efficiency of using UbD lesson planning model

The finding reveals that the UbD lesson planning model is efficient for designing activities to teach English as shown in table 3 on the learning results shows that the mean of the six pre-tests within six lesson is 24.69 (82.32%) and the mean of the posttest is 25.48 (84.94%). out of 30.

Table 3

Results of learning

Students	Unit 6			Unit7			Posttest 30
	Lesson 1 30	Lesson 2 30	Lesson 3 30	Lesson 1 30	Lesson 2 30	Lesson 3 30	
1	24	25	24	25	26	25	26
2	24	24	25	24	25	24	27
3	25	24	25	25	26	25	26
4	24	25	25	24	25	25	25
5	24	25	24	25	24	24	26
6	25	24	25	24	25	25	25
7	24	25	25	24	24	26	25
8	25	24	24	25	25	25	25
9	25	26	25	24	25	24	26
10	24	25	24	25	24	25	26
11	25	25	25	24	25	25	25
12	26	25	24	25	24	24	26
13	25	24	25	24	25	25	25
14	26	25	25	24	25	26	26
15	26	25	24	25	24	26	26
16	25	24	24	24	26	25	25
17	24	25	25	26	25	24	25
18	24	25	25	26	24	25	26
19	25	25	24	24	25	26	25
20	24	24	25	25	25	24	24
21	25	25	25	24	24	25	25
22	25	25	25	24	25	25	25
23	26	24	24	25	25	24	26
24	25	25	25	24	24	25	25
25	26	26	26	25	26	25	26
26	24	26	25	24	24	26	26
27	25	24	24	25	26	25	25
28	24	24	25	25	24	24	25
28	24	24	25	25	24	24	25
29	25	24	25	24	25	25	25
30	25	25	24	25	24	25	25
31	24	24	25	25	25	24	25
32	25	24	25	24	24	25	26



Students	Unit 6			Unit7			Posttest 30	
	Lesson 1 30	Lesson 2 30	Lesson 3 30	Lesson 1 30	Lesson 2 30	Lesson 3 30		
33	25	25	24	26	25	25	26	
34	24	24	25	25	25	26	26	
35	25	25	25	24	26	25	25	
36	25	25	24	25	25	24	25	
37	24	24	25	24	24	25	24	
38	24	25	25	25	25	25	26	
39	26	25	25	24	25	25	25	
40	26	25	24	25	25	24	26	
41	25	24	25	26	24	24	25	
42	26	25	24	25	24	25	25	
43	25	25	24	24	25	24	26	
44	24	24	25	26	24	25	26	
45	25	25	25	24	25	25	26	
46	25	25	25	24	24	24	25	
47	24	24	25	24	25	25	26	
48	24	25	24	25	25	24	26	
49	25	25	25	25	24	24	25	
50	24	24	25	25	25	25	27	
51	25	25	24	24	26	24	24	
52	24	24	25	25	26	25	26	
53	24	25	24	24	25	25	27	
54	24	24	24	25	24	24	26	
55	25	24	25	24	25	25	25	
56	24	25	24	24	25	25	25	
57	25	25	24	25	25	24	25	
58	24	24	24	25	24	25	25	
59	25	25	25	24	25	25	26	
60	25	24	24	25	25	25	25	
61	24	25	25	25	24	24	26	
62	25	26	24	24	25	24	26	
Total score							9187	1580
Mean							24.69	25.48
Percent							82.32	84.95

Based on the outcome of learning in the table1 above, it can be assumed that the UbD lesson planning model is suitable for teaching English when mean score of both pretest and posttest was very high (82.32/84.94), which is higher than the expectation of E1/E2 (75/75). Moreover, the efficiency index is plus (0.14) as shown in table 2 below:

*Table 4
The results of E1/E2 and E.I*



E1/E2	82.32/84.94
$E.I = \frac{p2-p1}{Total-p1}$	0.14

Moreover, the result of interviewing in terms of pre-service teachers' satisfaction toward the UbD lesson planning model showed that they felt satisfied with the result of learning. All of them agreed that UbD was useful for teaching English and any subject. They said if teachers had a clear understanding of the model, they could design activities to teach, strategies to teach, and activities and strategies to assess with freedom. They were not controlled by the existing contents in the textbooks.

4.2 Good points, weak points, suggestions

When the UbD lesson planning model was used for designing activities to teach English, good points, weak points and suggestions were taken notes and recorded from the observation notes and interviews. The detail of the findings is described below:

4.2.1 Good points:

The finding shows some good points of using UbD for teaching English such as:

(1) All of pre-service teachers thought that UbD lesson plan was suitable for teaching English, this can be seen from their notes and interviews "UbD consists of clear structure with three stages: goals, teaching activities, which can be used as evidences, and lesson plan, so that it can be used as good guideline for teachers to follow when teaching" " UbD has good structure and clear goals, so we won't get lost when teaching" "UbD is useful for teaching English, when using it we need to think of what to teach in order to success and what to assess in order to confirm the success"

(2) Using UbD for teaching helps teachers prepare suitable teaching tasks before teaching as can be seen from these statements "we need to prepare tasks to teach, or to assess in accordance with the teaching goals before designing activities to teach". "UbD consists of clear goals in the first stage that helps us to use as guideline to design what to assess and to teach in the second stage"

(3) Using UbD makes teachers feel confident with the learning results, since teachers can check what students achieve after learning as shown the opinions found "we know what need to achieve, so we know what to assess", "we have the learning focus, so we feel confident" "we feel confident when we know what learning outcomes are"

(4) Using UbD helps teachers to design activities to teach as found in the interviews "we can cut the similar tasks out" "we can adapt the task to use within the learning time" "we can create tasks for students to practice in order to achieve the learning outcomes" (5) using UbD help teachers to put tasks in order when teaching as it was heard from one of the interviewee that "when using UbD, I have freedom to design. I can put what activity to teach first and what activity next" one of them said, "I also can cut out the similar activities, I can design the activities to teach" (6) using UbD can make students active and can obtain desired learning



outcomes of the lesson as some statements found in the observation notes “students enjoyed learning” “students could achieve the desired learning outcome of the task”

4.2.2 Weak points

The findings from interviews show several difficulties faced such as: (1) when preparing UbD lesson plan, teachers use long time to think and to design the activities to teach as found in the interview that “I used long time preparing tasks for teaching” and one added that “yes, I used long time analyzing contents of the lesson before designing learning tasks”

(2) UbD lesson planning model has too many boxes with topics that are similar as can be seen in the finding statements that one of the groups wrote “the UbD lesson plan has too many boxes with different topics to add, which are similar, so I do not know what to put in each topic” one of the interviewees said “I am confused what to add in each topic in boxes in stage one and in stage two, especially in the box of ‘understanding’ and of ‘knowledge’”

(3) teachers do not feel confident to adapt the existing contents to teach to match to the needs, knowledge of students, learning situation and time as one said that “I feel worried if I cut the tasks from a lesson out”, one added, “I do not know how to adapt the content of tasks and lesson” and one said “I only cut the similar task out, however, some lessons are still long. I wish I could adapt them”

(4) It is confusing to set the goal of the lesson as shown in the interviews that “I do not know how to write the lesson goal” and one added “I am not sure of what goal of the lesson is; I and my friend set different goal when teaching the same lesson”

(5) It is not easy to set the suitable time when designing the tasks and activities to teach as shown in the statements found in the observation notes “I could not complete teaching all the tasks, since I did not know the background knowledge of students” “I do not know students well, so when I used UbD, I sometimes could not finish teaching of what I planned, and sometimes it ended sooner than I planned.” and one noted that “although I adapted the teaching content, I still could not complete all of the tasks I had planned”

4.2.3 Suggestions

Based on the difficulties found, the suggestions were recommended such as:

(1) teacher trainers had to clarify the meaning of each topic in the UbD lesson planning model, such as goal, understanding, significant questions, knowledge, skills of the lesson in the first stage and tasks and evidence in the second stage of the UbD lesson planning model with clear examples. One interviewee said “if we knew how to set clear goal, and know clearly what to add in each topic in the first and second stage, we could shorten the time to prepare the lesson plan” and one said “if I could write clearly in the first stage, I would be sure to design tasks to assess or to use for teaching”

(2) teacher trainers had to train the strategy to adapt the existing contents, especially strategy to adapt the tasks and lessons to match to students’ background knowledge, which were mentioned that “trainers should train how to adjust the contents with the assigning time” and one wore that “we need to have the competence to adapt existing content of the lesson”



(3) when training pre-service teachers' the strategy to adapt the tasks and the lesson, the trainer had to explain clearly the outside factors like students' knowledge, learning environment, and length of time before adapting as It was found from the suggestion for the problem of adapting the task but they still could not complete all of the activities planned within the existing teaching time that "It would be better if teacher trainer explained more clearly what to think and do before redesigning the existing contents"

5. Discussion

The research aims at finding the efficiency of using UbD lesson plans by having pre-service teachers use it for teaching English and evaluate the results of learning as well as their opinions on difficulties faced, good points and some suggestions. Based on the difficulties found, some points need to address in the discussion such as:

It is common to find that pre-service teachers used a long time to prepare lesson plans, since new teachers or pre-service teachers would find it long time to prepare UbD lesson plan for teaching, since they have exposed of using the forward design lesson planning models of these educators, such as Tyler 1949; Richards & Lockhart, 1994; Freeman 1996; Bailey, 1996; Shrum and Glisan, 1994; Echevarria et al, 2007; Brumfit, 1979 that starts by identifying lesson goals, then what and how to teach,

and lastly the assessment or feedback, which have been used for teaching them in the most of their learning time. Moreover, when using these models, teachers do not need to adapt the content of lessons or tasks before using them for teaching like when using UbD, the backward design lesson planning model. Teachers have to design or adapt the contents for teaching. Therefore, it is not strange that pre-service teachers used a long time to prepare the lesson plan for teaching.

In Laos, teachers used to teach all of the existing tasks in textbooks thoroughly without adaptation. Therefore, it is not strange that the finding showed that they felt unconfident when they had to cut some tasks out or adapt existing content of the lesson, and it would be a good idea if teachers and educational systems focused on learning outcomes or competency-based learning rather than content-based education and process-based teaching techniques.

It would be easier for pre-service teachers if they could identify learning outcomes clearly in the first stage, specifically the topics on understanding, significant questions, knowledge and skills when using the UbD backward design planning model for teaching English and they can identify the surrounding situation like teaching time and students' basic background knowledge, they would have found their way to design tasks for teaching and they would feel confident or satisfied to change the way of designing activities for teaching. Moreover, they would have freedom to design-not to be controlled by the content of the textbooks and by the limitation of the environment.

Teachers and also pre-service teachers have had long experience of listening and doing as it was told to do rather than they think and design what to do. Therefore, when they are asked to teach a subject based on existing contents of the textbooks, they feel confident to follow the commands, and it is not easy to



change the way of working, thinking and doing, especially for them to think, adapt or redesign the official existing content of textbooks that were designed by the central government before teaching.

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The development of Learning Achievement of Grade 10 Students on Poem Writing to Promote Higher-Order Thinking by Using Activities of Yuva Kavi Buriram Phitthayakhom

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Abstract

The purposes of this research were 1) to find the efficiency of the learning management plan for developing the learning achievement of grade 10 students on the course of poem writing to promote the higher-order thinking by using Yuva Kavi Buriram Phitthayakhom activities; 2) to compare the learning achievements before and after learning of the students; 3) to compare poem writing skills after receiving the learning management; and 4) to evaluate the satisfaction of students after receiving the learning management. The sample used in this research was 41 persons of the grade 10 students at Buriram Phitthayakhom School, Buriram Province, which had been selected by purposive sampling. The research tools were 9 learning management plans with 35 items of poem writing skill test, 30 items of learning achievement test, with difficulty (p) 0.25 to 0.75, discriminating power (r) ranging from 0.29 to 0.75, and the reliability of the whole test at .8616 and the satisfaction form rating of 10 items. Statistics used in data analysis were mean, standard deviation and research hypothesis testing using t statistic (One Sample t-test).

The findings of research were as follows: 1) a learning management plan for the development of learning achievement of grade 10 students on the course of poem writing to promote the higher-order thinking; by using Yuva Kavi Buriram Phitthayakhom activities with the process and product-based development test (E1 / E2) was equal to 84.45/84.14 according to the criterion (80/80). 2) The student's average score before learning was 9.97 points and after learning was 25.24 points. The effectiveness index was *24.831 indicating that students had learning achievement after learning higher than before with statistically significance at .05 level. 3) The student's average score before learning was 6.56 and after learning was 29.56, and the effectiveness index was *50.514, indicating that students' learning achievement after learning was significantly higher than before at the .05 level, and 4) the student's satisfaction after receiving the learning management at overall level was at the highest level.

Keywords: Poem, promoting higher-order thinking, Yuva Kavi, Buriram Phitthayakhom

1. Introduction

Thai Poem was the heritage of wisdom that the forefather had created for the ancestor to learn. It was skill of writing that depended on the formality of prosody



integrated with the creative thinking, word use, style, figure of speech, imagination through poetic art. The data from interview with the educational supervisor of Buriram Education Service Area Office about the problem of learning management of language in the poem writing state that:

Mostly, it was from the skill of process of learning management of Thai subject areas, which was divided into four contents and in each content, there were more indicators of content in learning management. Writing of poem was one of skill in process to provide to student to learn, which was included in the principle of writing of prose and poem by few indicators, and what the teachers should be aware of to get student gain more skill in poem writing was that they had to integrate poem in the process of learning management for each indicator or even in normal teaching, the teachers should integrate the poem to enable students perceive more these contents. (T.Khoram, Personal communication, 2021)

The Yuva Kavi Buriram Phitthayakhom activities began first time in the year 2015 by the group of both lower and higher secondary school students who were interested in composing the poem to develop the skill of writing poem by critical thinking and creative thinking method toward the creation of quality poem to meet the norm of competition in various activities, which were quite evident in achievement, later, in the year 2016 to present day, the strategy of composing poem to be contest in competition for the high school students was used in learning activities management for further achievement in the classroom learning.

The researcher took responsibility to manage the course on creative writing II code Th 31208, was interested to study the development of learning achievement of grade 10 students in writing poem to promote the higher-order thinking by activities of Yuva Kavi Buriram Phitthayakhom to be information for further development of skill of high school students.

2. Objectives of Research

2.1 To get the effectiveness of learning management plan in development of learning achievement of grade 10 students in the writing poem to promote the higher-order thinking by activities of Yuva Kavi Buriram Phitthayakhom.

2.2 To compare the pretest and posttest learning achievement of students after receiving the learning management in writing poem to promote the higher-order thinking by Yuva Kavi Buriram Phitthayakhom of grade 10 students.

2.3 To compare the skill of poem composition competency in writing poem to promote the higher-order thinking by activities of Yuva Kavi Buriram Phitthayakhom of grade 10 students.

2.4 To evaluate the satisfaction of students after receiving the learning management in writing poem to promote the higher-order thinking by activities of Yuva Kavi Buriram Phitthayakhom of grade 10 students.

3. Hypothesis of Research

3.1 The effectiveness of the plan of learning management in development of learning achievement of grade 10 students in writing poem to promote the higher-order thinking by activities of Yuva Kavi Buriram Phitthayakhom was in accordance with the set standard of 80/80.



3.2 The learning achievement in pretest and posttest of student was obtained after receiving learning management in writing poem to promote the higher-order thinking by activities of Yuva Kavi Buriram Phitthayakhom of grade 10 students.

3.3 The students who learned the writing poem to promote the higher-order thinking by activities of Yuva Kavi Buriram Phitthayakhom for grade 10 students, attained the learning achievement after learning higher than before learning.

3.4 The satisfaction of the students who went through the course on writing poem to promote the higher-order thinking by activities of Yuva Kavi Buriram Phitthayakhom for grade 10 students was at a highest level.

4. Framework, Concept, Research Theory

The researcher had made use of the conceptual framework of Chaiwat Chumnasiao (2017, p. 9) from the research: 'A development of model of teaching of writing in three coordinated methods to promote the higher-order thinking and learning achievement of high school students' and applied it in development of learning achievement of grade 10 students on the course of poem writing to promote the higher-order thinking by activities of Yuva Kavi Buriram Phitthayakhom

5. Scope of research

Population and Sample

The population consisted of 82 persons of the grade 10 students who enrolled in the second semester, academic year 2021, Buriram Phitthayakhom School, under the Secondary Educational Service Area Office 32, who had studied the course on creative writing II in the Thai learning subject areas.

The sample consisted of 41 persons of the grades 10 /12 students who enrolled in second semester of academic year 2021, Buriram Phitthayakhom School, under the Secondary Educational Service Area Office 32, who had studied the course on creative writing II in the Thai subject areas, in 1 batch, which was acquired by purposive sampling.

Variables Studied

The Independent variables were the learning management plan for the course on creative writing of grade 10 students in the Thai subject areas on the course on poem writing to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom for the grade 10 students.

The dependent variables were learning achievement on the course on poem writing to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom for the grade 10 students and the satisfaction of the learners.

Expected Benefits

1. Getting to Know the effectiveness of the learning management plan of development of learning achievement of the grade 10 students on the course of poem writing to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom.



2. Getting to compare the students' pre-study and post-study achievement after receiving the learning management on the course of poem writing to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom of the grade 10 students.

3. Getting to know the results of the comparison of poem writing skills in course of poem writing to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom of the grade 10 students.

4. Getting to know the satisfaction of the students after being managed to learn about writing poems to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom of grade 10 students.

Terminology Definition

Poem writing to promote the higher-order thinking by using activities of Yuva Kavi Buriram Phitthayakhom referred to the unit learning about writing poems to promote the higher-order thinking based on the concepts of Chumnasio (2017, p.9) consisted of 2 skills: analytical thinking, which has 7 steps to be used in conjunction with the activities of Yuva Kavi Buriram Phitthayakhom as follows: 1) Preparation of concepts before writing; 2) Linking information to writing Phitthayakhom; 3) Building an understanding of writing assessment; 4) Creating the writing process; 5) Writing practice; 6) writing performance evaluation; and 7) searching for new topics to practice writing by using a presentation method.

Yuva Kavi Buriram Phitthayakhom activities referred to poem writing activities organized by the interested group of both lower and higher secondary school students at Buriram Phitthayakhom School, which were established in 2015 to the present day, which consisted of the storytelling of Yuva Kavi Buriram Phitthayakhom, game of Buriram Phitthayakhom Yuva Kavi, strategies for poem writing for competition of high school students and best practice presentations, etc.

Grade 10 students referred to the grade 10 students at Buriram Phitthayakhom School, under the Secondary Educational Service Area Office 32, who took the course on creative writing II, code Th 31208 in academic year 2021.

6. Research Methodology

Research Tools

1. The tools used in the development were: 9 learning management plans for the course on creative writing II code Th 31208 of grade 10 students who took up the course on poem writing in the Thai subject areas to promote the higher-order thinking by using activities of Yuva Kavi Buriram Phitthayakhom in duration of 10 hours in total.

2. A test to evaluate the learning achievement in course on creative writing II code Th 31208 of grade 10 students who took up the course on poem writing in the Thai subject areas to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom. The learning achievement test was used to test with 40 students of grade 10/13 of Buriram Phitthayakhom School who were not the same sample group. The revised learning achievement test was taken and published as a complete version for experimentation with a sample of 41 persons.



3. Students' satisfaction survey on poem writing to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom of grade 10 students in ten items were a rating scale model

Data Collection

1. The researcher carried out the learning management according to the learning management plan in the communication and presentation course comprising 9 plans in 10 hours.

2. The researcher used learning achievement on the course of creative writing II code Th 31208 of grade 10 students on the course of poem writing to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom. It is a multiple-choice typical test with 4 choices of 30 questions after the end of the learning process.

3. The researcher used a test to evaluate the skill of writing poem on the course of creative writing II, code Th 31208 of the grade 10 students about writing poems to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom. It is a multiple-choice typical test with 4 choices of 30 questions after the end of the learning process.

4. The researcher collected a survey to evaluate students' satisfaction towards the course of poem writing to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom of the grade 10 students after the end of learning.

7. Data Analysis

Determination of the difficulty of the learning achievement test has a difficulty value (p). 0.27 to 0.73, the discriminant power (r) ranging from 0.27 to 0.64, and the reliability of the whole test equaling to 0.6558. The statistics used to analyze the data were mean, standard deviation, and testing the research hypothesis using t-statistic values (One Sample t-test).

8. Results of data analysis

The data in all 4 main issues were collected according to the objectives, and then the results of data analysis were presented in order as follows.

1. Efficiency of the Learning Plan

With regard to the development of learning achievement of grade 10 student on poem writing to enhance higher-order thinking by using Yuvakavi Buriram Phitthayakhom activity In the second semester of the academic year 2021, the instruction was conducted according to the learning management plan and proposed to the administrators of Buriram Phitthayakhom School under the Office of the Secondary Education Service Area 32, which is tested with 41 student of the grade 10/12, as shown in the following table.



Table 1
Efficiency of learning management plan according to criterion 80/80 (E1/E2)

Criterion	Performance values	Interpretation
E ₁	84.45	In line with the set criterion
E ₂	84.14	In line with the set criterion

From the table, it was found that the learning management plan for the development of learning achievement of the grade 10 student on poem writing to promote higher-order thinking by using Yuvakavi Buriram Phitthayakhom activity has efficiency (E1 / E2) equal to 84.45/84.14 which is in line with the set criterion (80/80).

2. Results of comparison of pre-learning and post-learning achievement

The development of learning achievement of the grade 10 student on poem writing to enhance higher-order thinking by using Yuvakavi Buriram Pittayakom activity for total 41 students of the grade 10/12, appeared in the following table.

Table 2
Comparison of learning achievement in Pre-test and Post-test

Score	n	\bar{X}	S.D.	t
Score in Pre-Test	41	9.97	3.12	*24.831
Score in Post-Test	41	25.24	2.14	

Note* Statistical significance at the .05 level

From the table, it was found that the student's average score before learning was 9.97 and after learning was 25.24, and the effectiveness index was *24.831, indicating that students' learning achievement after learning was significantly higher than before at the .05 level.

3. Result of comparison of poem writing skills and abilities

The results of comparison of poem writing skill and ability about writing poem to promote higher-order thinking by using Yuvakavi Buriram Phitthayakhom activity for the grade 10 that was tested with 41 students of grades 10/12, were shown in the following table.

Table 3
Results of comparison of poem writing skill before and after learning

Skill and ability in Poem writing	test scores	full scores	\bar{X}	S.D.	t
Step 1	Pre-test	5	1.07	1.00	*15.981
	Post-test	5	4.17	0.73	
Step 2	Pre-test	5	.97	0.87	*17.974



	Post-test	5	4.34	0.76	
Step 3	Pre-test	5	0.73	0.74	*18.774
	Post-test	5	4.26	0.92	
Step 4	Pre-test	5	0.95	0.94	*20.916
	Post-test	5	4.46	0.67	
Step 5	Pre-test	5	1.09	1.11	*16.186
	Post-test	5	4.41	0.74	
Step 6	Pre-test	5	0.80	0.87	*17.461
	Post-test	5	3.90	0.73	
Step 7	Pre-test	5	0.92	0.87	*17.819
	Post-test	5	4.00	0.67	
Total	Pre-test	35	6.56	2.15	*50.514
	Post-test	35	29.56	1.78	

Note* Statistical significance at the .05 level

From the table, it was found that the student who had developed the skill of poem writing about writing poem to promote higher-order thinking by using Yuvakavi Buriram Phitthayakhom activity for grade 10 students had a higher score after learning than before, it was found that the student's average score before learning was 6.56 and after learning was 29.56, and the effectiveness index was *50.514, indicating that students' learning achievement after learning was significantly higher than before at the .05 level

4. Satisfaction Assessment Results

The satisfaction of the grade 10 students after developing the skill sand ability in poem writing about writing poem to promote higher-order thinking by using Yuvakavi Buriram Phitthayakhom activity, was as shown in the following table.

*Table 4
Mean, Standard Deviation and satisfaction assessment of students on the development of learning achievement of grade 10 students on writing poem to promote higher-order thinking by using Yuvakavi Buriram Phitthayakhom activity*

Item	\bar{X}	S.D.	Satisfaction Level
1. How much the development of poem writing skill and ability in poem writing had been developed	4.63	0.70	highest
2. How many media and equipment for learning are sufficient and appropriate.	4.68	0.65	highest



3. How much the Yuvakavi Buriram Phitthayakhom game is appropriate	4.41	0.87	high
4. How much the process of developing poem writing skills is clear and complete	4.66	0.73	highest
5. How much the classroom atmosphere is appropriate.	4.85	0.48	highest
6. How much the learning management period is appropriate	4.54	0.78	highest
7. How much 7 steps Learning process document, test is appropriate	4.59	0.74	highest
8. How much the Yuvakavi Buriram Phitthayakhom activity is appropriate	4.54	0.84	highest
9. How much the criterion for assessment of poem writing is appropriate	4.56	0.74	highest
10. How much the atmosphere of learning, presentation is appropriate	4.34	0.91	high
Total	4.58	0.74	highest

From the table, it was found that students' satisfaction towards the development of the learning achievement of the grade 10 student on writing poem to promote higher-order thinking by using Yuvakavi Buriram Phitthayakhom activity by overall was at the highest level ($\bar{X} = 4.58$, S.D.= 0.74). When sorted from the first 3 descending order, it was found that it was the item of how much the classroom atmosphere was appropriate, which was at highest level ($\bar{X} = 4.85$, S.D.= 0.48); which was followed by the item of how many the media, equipment for learning were sufficient and appropriate, which was at the highest level ($\bar{X} = 4.68$, S.D.= 0.65) and the item of how much the process of developing poem writing skill was clear and complete, which was at the highest level ($\bar{X} = 4.66$, S.D.= 0.73). and the item of how much atmosphere of learning and presenting was appropriate, which was at a high level ($\bar{X} = 4.34$, S.D.= 0.91).

9. Research Results

9.1 A learning management plan for the development of learning achievements of the grade 10 students on poem writing to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom. The efficiency of process and product-based development test (E1 / E2) was equal to 84.45/84.14, which was in accordance with the set standard (80/80).

9.2 The average score of students before learning was 9.97 points, after learning was 25.24; the index of effectiveness was *24.831, indicating that the students gained a higher score of learning achievement after learning than before learning with statistical significance at .05 level.

9.3 The student who had developed the skill of poem writing about writing poem to promote higher-order thinking by using Yuvakavi Buriram



Phitthayakhom activity for grade 10 students had a higher score after learning than before, it was found that the student's average score before learning was 6.56 and after learning was 29.56, and the effectiveness index was *50.514, indicating that students' learning achievement after learning was significantly higher than before at the .05 level

9.4 Students' satisfaction towards the development of learning achievement of grade 10 students on poem writing to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom, by overall level was at the highest level ($\bar{X} = 4.58$, S.D. = 0.74). When ranked in descending order of the first 3 orders, it indicated that the item of how appropriate the classroom atmosphere was ($\bar{X} = 4.85$, S.D. = 0.48), which was followed by the item of how appropriate media, equipment, sufficient learning classroom were, which was at the highest level ($\bar{X} = 4.68$, S.D. = 0.65) and followed by the item of how complete, and clear the process of developing poem writing skills was, which was at the highest level ($\bar{X} = 4.66$, S.D. = 0.73), and the item that students had the least satisfaction with was how appropriate the learning environment and the presentation was, which was at a high level ($\bar{X} = 4.34$, S.D. = 0.91)

10. Result Discussion

From the present research results on the development of learning achievement of grade 10 students on the course on poem writing to promote the higher-order thinking using the activities of Yuva Kavi Buriram Phitthayakhom, there are important issues to be discussed as follows:

1. A learning management plan for the development of learning achievements of grade 10 students on the course on poem writing to promote the higher-order thinking by the activities of Yuva Kavi Buriram Phitthayakhom, attained the efficiency of process and product based development test (E1 / E2) equal to 84.45/84.14 which was in accordance with the criterion (80/80), which was consistent with a study of Tharasak (2012, p. 63) who used exercise for typical Kap poem writing skill on the course on Thai language for grade 10 students of Chai Prakan School, Chai Prakan District, under the Secondary Educational Service Area Office 34, whose efficiency of process and product based development test (E1/E2) was 89.03/83.75 and also in consistent with a study of Sueptheep (2018, p. 87) who found that the efficiency of lesson promoting skill in typical Khlong wrapped with Kap was equal to 84.03/82.16.

2. The students had learning achievement higher than before learning at the statistical significance of .05 level, which was consistent with a study of Sueptheep (2018, p. 87), who found that the learning achievement of grade 12 students in poem writing in the typical Khlong wrapped with Kap after learning was higher than before learning with the statistical significance at .05 level.

3. Students who received the development of poem writing skills about poem writing to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom of grade 12 students who attained learning achievement after learning higher than before learning with the statistical significance at .05 level, which was consistent with the results of the fourth round of external quality



assessment, which was assessed external quality by ONESQA, fourth round, 2021, which summarized the overall assessment results according to standard 1 on learner quality, focus on systematic student promotion. The results were considered according to the five indicators, consisting of: 1) identifying learner quality goals; 2) identifying methods for systematically improving learner quality according to learner development goals; 3) having learner achievement according to goals of learner development; 4) The results of the student's quality assessment were used to develop the learners in terms of their achievements to be higher; 5) the results of the quality assessment of the learners were presented to those involved. The results of the assessment were at a good level for all 5 items (Educational Accreditation and Quality Assessment Office (Public Organization), 2021, p. 67)

Finding of Research

1) The findings on creativity at a personal level indicated that Ms. Sachirat Sukkloi received an award winner of the provincial poem contest on the occasion of the birthday of His Majesty King Bhumibol Adulyadej the Great, National Day and Father's Day, December 5, 2021, as it was said by Wongsawan (2020, pp. 8-9) that thoughts arising from imagination was an idea that has many new directions and many different perspectives, which was different from others and no one had ever expected. The results

of creativity can be expressed in concrete or abstract forms. But it can solve the problem or help life go on in a better way, which benefited yourself and others, which consisted of three components that need to be studied, namely, creative thinking, creative process and creative productivity.

2) The findings on creativity at the group level are appropriate, clear in the way of thinking. The group working process created the concrete product and empirical product, won the second runner-up prize of the Isan literary contest for the royal trophy from Her Royal Highness Princess Maha Chakri Sirindhorn for the year 2021, which was organized by the Faculty of Humanities and Social Sciences, Mahasarakham University. The representative team of Buriram Phitthayakhom School included Ms. Kopkun Phaha, Ms. Oraphan Patesang, Ms. Nawipriya Suksai, Ms. Patcharaphon Phetleot. As it was said by Wongsawan (2020, pp. 8-9) that the idea of people working and interacting together was an idea that has many new directions and many different perspectives, which was different from the one before and no one had ever expected. The results of creativity can be expressed in concrete or abstract forms. But it can solve problems or help life go on in a better way, which was beneficial to oneself and others, which have components that need to study all 4 areas, including creative thinking, creative process, creative productivity and working creatively with others.

3) Students' satisfaction towards the development of learning achievement of grade 10 students in course on writing poems to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom, by overall level was at the highest level, which was consistent with a study of Sueptep (2018, p. 87) which stated that the students had the highest level of satisfaction with the lessons to enhance their writing skills in the typical Khlong wrapped with Kap.



11. Recommendation

From the results of the current research on the development of learning achievement of grade 10 students on writing poems to promote the higher-order thinking using activities of Yuva Kavi Buriram Phitthayakom, there are suggestions as follows:

1. Instructional recommendations

1.1 Developing poem writing skills to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom, should be provided in all 7 steps to enable students develop more analytical thinking and creative thinking.

1.2 Development of learning achievements on poem writing to promote the higher-order thinking by using the activities of Yuva Kavi Buriram Phitthayakhom, should be integrated with independent study (IS) to be a platform to show learners' potential in poem writing in a platform to show learners' potential at international standard schools, which was an extension of the presentation of excellent work to build self-esteem and society.

2 Suggestions for the future Research

2.1 Development of the higher-order thinking by GPAS of 5 Steps Process for high school students.

2.2 Development of poem writing Skills by GPAS of 5 Steps Process for High School Students.

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A Study of Mathematics Achievement Through Learning Management Using the Flipped Classroom Method of The First Year in Zhoukou Vocational and Technical College, Henan Province, China

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Abstract

The purposes of this research were to: 1) compare the mathematics achievement of the first year students before and after learning through the flipped classroom method, and 2) compare the mathematics achievement of first year students after being exposed to the flipped classroom method with a set criterion of 70 percent of the full marks, and 3) assess the student's satisfaction toward on the flipped classroom method. The samples used in this study were 30 first year students at Zhoukou Vocational and Technical College, Zhoukou city, Henan province, China. They were selected by cluster random sampling. The research instruments were as follows: 1) Five lesson plans using the flipped classroom method on the topics of basic properties of inequalities, Inequality is represented by an interval, linear inequality with one unknown, one-variable quadratic inequality, Inequality involving absolute values. 2) An achievements test was used with a reliability of 0.73. 3) The reliability of student satisfaction is 0.76. The statistics used for data analysis were the mean, standard deviation, and one-sample t-test of a sample.

The results of the study were as follows:

1) The mathematics achievement of the first-year students after being exposed to the flipped classroom method was higher than before at a statistically significant level of 0.05.

2) The mathematics achievement of the first-year students after being exposed to the flipped classroom method was higher than the 70% criterion at the 0.05 statistical significance level ($\bar{X}= 22.00$ S.D. =1.46).

3) The satisfaction of the first-year students after being exposed to the flipped classroom method was at a higher level ($\bar{X}=4.18$ S.D.=0.72) .

Keywords: Flipped Classroom, Mathematics Achievement, Students' Satisfaction

1. Introduction

In 2010, in Chapter 19 of the Outline of the National Program for Long - and Medium-Term Educational Reform and Development (2010 - 2020), it was clearly proposed to accelerate the process of educational informatization, including strengthening the development and application of high-quality educational resources and strengthening the application of information technology (China



2010-2020) and to promote the application of information technology in the field of education and strengthen the integration of information technology and curriculum, this not only provides a new means of education, but also has a profound impact on the concept, method and content of education and teaching, which has become an important strategy to promote the reform and development of education.

With the rapid development of science and technology, people's pursuit of quality of life in modern society is getting higher and higher, which puts forward the requirements for training talents. What we need is a kind of innovative talent, and this kind of creativity is not only refers to the invention or discovery of something, but also to enabling people to adapt to this rapid development and competition of the era. According to the research of social psychology, the key of people's ability to adapt to the society and make achievements lies in their ability to raise problems, analyze problems and solve problems creatively. But the ultimate goal of discipline education is to improve students' ability to survive in modern society and give more returns to society. Therefore, the reform of basic quality education has become the general trend.

1.1. Ignoring the reform of mathematics quality education

The reform of mathematics quality education, With the rapid development of science and technology, people's pursuit of quality of life in modern society is getting higher and higher, which puts forward the requirements for training talents. What we need is a kind of innovative talent, and this kind of creativity is not only refers to the invention or discovery of something, but also to enabling people to adapt to this rapid development and competition of the era. According to the research of social psychology, the key of people's ability to adapt to the society and make achievements lies in their ability to raise problems, analyze problems and solve problems creatively. But the ultimate goal of discipline education is to improve students' ability to survive in modern society and give more returns to society. Therefore, the reform of basic quality education has become the general trend. At present, the basic reform of mathematics basic education in China has the following aspects: First, quality education concept is more important to the ability of innovation. Second, mathematics teaching content should be based on comprehensive learning, pay more attention to the effective connection and integration between disciplines, use modern technology to design teaching, and teach the content suitable for students and social development. Third, in terms of mathematical learning methods, both inquiry learning and other learning methods should be based on what students have learned (Li Xiaogang et al. 2013).

1.2. Integration of mathematics curriculum and information technology

Integration of mathematics curriculum and information technology. Nowadays, information technology has obviously become a powerful driving force for the construction of discipline learning. Any reform in the field of education, including teaching reform and curriculum reform, can never ignore it internally. At present, the reasonable infiltration of subject teaching and contemporary information technology has been the problem of course reform. The latest promulgation of the Outline of Basic Education (Tian Aili, 2014), means that



the reform of educational curriculum and the informatization of primary and secondary education is combined, and at the same time, the way forward is determined for the integration of mathematics curriculum and information technology. According to the new curriculum standards under the development of curriculum resources, modern information technology is emphasized in the teaching process. The combination of modern technology and basic mathematics courses become a strong help for students to learn mathematics, liberate students from complex operations, so that students can spend more time to participate in more realistic learning life, so that students' practical ability to exercise.

1.3. The arrival of the flipped classroom in the new century

The flipped classroom has become a buzzword in education in recent years, but the notion of “flipped classroom” (Baker 2000a, b) was discussed in the literature as early as the year of 2000. The flipped classroom instructional strategy is not new, but it has gained prominence recently due to the increasing access to digital technologies, resources, and broadband Internet connectivity (Sun et al. 2018; Zhai et al. 2017). In 2007, in order to help absent students, make up their lessons, two chemistry teachers of a school in the United States recorded teaching videos and posted them on the Internet for students who did not attend the class to learn, and got a good response (Liu Wei&Chen Bingbing, 2016) . After a period of time, the two teachers began to boldly let all the students watch the teaching video before class, and concentrated on solving the problems existing in the class. This teaching mode was widely welcomed by the students. This teaching mode changes the traditional teaching mode. The new knowledge explained by teachers in class is replaced by students watching teaching videos at home under the supervision of parents, and the deepening application of knowledge is turned into the solution of teachers' perplexities in class. "Traditional classroom" in the basic acceptance of new knowledge from the teachers in class means that students practice after class internalization and absorption, and the teacher in the classroom "flipped" through information technology means that micro videos carefully prepared before class. Students in the class, after learning the new knowledge in the classroom, will have more autonomy as teachers and students answer questions to complete individualized counseling. On this basis, teachers carry out more in-depth teaching activities. This kind of teaching reform practice can allow students to design individual learning programs according to their own learning habits, and improve the efficiency of self-learning and the utilization rate of time.

2. Research objectives

This research consisted of three objectives:

2.1 To compare the mathematics achievement of first year students before and after being exposed to the flipped classroom method.

2.2 To compare the mathematics achievement of first year students with the determined criteria with a set criterion of 70 percent of the full marks.

2.3 To assess first year students' satisfaction toward the flipped classroom method.



3. Research hypotheses

3.1 The mathematics achievement of first year students after being exposed to the flipped classroom method is higher than before.

3.2 The mathematics achievement of first year students after being exposed to the flipped classroom method is higher than 70%.

4. Research Methodology

4.1 Samples

4.1.1 The population in this study was 150 students (from five classes) at the first-year college stage at Zhoukou Vocational and Technical College in the academic year 2022, Zhoukou city, Henan province, China.

4.1.2 The samples for this study were 30 first year students (from one class) at Zhoukou Vocational and Technical College in the academic year 2022, which were selected by a cluster random sampling method.

4.2 Research instruments

Instruments for measuring mathematics achievement

1) Instructional innovation for the flipped classroom comprised of five steps. The first step was to combine the learning guide plan and micro-class video, carry out pre-class learning, and complete the autonomous task list. In terms of teacher activities, through the analysis of the course content, the teacher understood the main learning content of this lesson, and made the micro-video and learning guide plan of this lesson. In terms of student activities, students watched videos in groups, discussed and summarized problems, and searched for materials to solve the problems.

The second step was to discuss the problems in each part of the class. In terms of teacher activities, they summarized students' difficulties and shortcomings through observation. In terms of student activities, through group analysis and discussion, all groups shared their opinions about the course.

The third step involved the students' asking questions in class. According to different levels, teachers carry out teaching. In terms of teacher activities, in class, teachers guided students to solve individual problems or consolidate the knowledge needed to be consolidated, and then expanded and supplemented according to the actual situation of the class. In terms of student activities, they discussed the problems together while watching the video. If the problem could not be solved in a group, the whole class was free to discuss it.

The fourth step was to teach each student according to their aptitude. In terms of teacher activities, they guided students with different learning levels to solve problems or consolidate knowledge. In terms of student activities, they consolidated knowledge through exercises.

The fifth step involved reflecting and summarizing. In terms of teacher activities, they performed individual evaluation and group evaluation. In terms of student activities, they evaluated each other

2) A total of five lessons and 10 hours of math instruction were assigned and with the highest level of suitability.

Instrument for measuring mathematics achievement



1) The math test had a total of 30 items, and the Index of Item Objective Congruence (IOC) of each item in the evaluation form was 0.8 higher than 0.76. The result of analyzing the IOC index showed that all test items were appropriate and could be used in the test difficulty (p) between 0.2-0.8 and discriminability (r) > 0.2 and an achievements test with a reliability of 0.73.

4.3 Data collection

The procedures of data collection were as follows:

- 1) The samples were given the pretest for measuring Mathematics Achievement with a constructed instrument.
- 2) The samples were taught by the flipped classroom method.
- 3) After finishing the instruction, the samples completed the post-test by using the same instrument, which was used in the pretest.

4.4 Data analysis

In this study, data were analyzed by using the statistical program according to the research objectives. Mathematics achievement was compared before and after the students were exposed to the flipped classroom method by using t-test for dependent sample.

5. Research Results

The results were presented according to the research objectives as follows:

5.1 Section 1 The results of comparing the mathematics achievement of the students before and after being exposed to the flipped classroom by using t-test for dependent sample are shown below.

Table 1 The results of comparing the different scores of mathematics achievement before and after being exposed to the flipped classroom method

Paired samples test

Group	N	Pretest scores		Post-test scores		t	p
		\bar{X}	S.D.	\bar{X}	S.D.		
Experimental group	30	15	1.60	22.00	1.46	29.20	.00

$P < 0.05$

Based on the results, we can conclude as follows:

As shown in Table 1, the students had mathematics achievement after being exposed to the flipped classroom method (post-test) greater than before (pre-test) at a .05 statistically significant level ($t = 29.20$, $p < 0.05$).

On average, Posttest scores were 7 points higher than Pretest scores (95%).

Thus, it can be concluded that, mathematics achievement of the first students after being exposed to the flipped classroom method was higher than before.



5.2 Section 2 The results of comparing mathematics achievement of students with the determined criterion set at 70 % by using t-test for one sample were as follows.

Table 2
The result of comparing the different scores of mathematics achievement after being exposed to the flipped classroom method with the criterion set at 70 percent

Group	N	Full score	Criteria score	\bar{X}	S.D.	t	p
Experimental group	30	30	21	22.00	1.46	3.75	0.0005

P < 0.05

Based on the results, we can conclude as follows:

As shown in Table 2, the average score for the mathematics achievement of the first-year students after being exposed to the flipped classroom method was 22.00 from a full score of 30 and the standard deviation was 1.46, which was statistically higher than the criterion of 70% at the .05 level of statistical significance.

Thus, it can be concluded that, the mathematics achievement of the first-year students who were exposed to the flipped classroom method was higher than 70%.

5.3 Section 3 The results of the students' satisfaction toward the flipped classroom method were as follows.

Table 3
The results of students' satisfaction with the lesson plans after being exposed to the flipped classroom method

NO.	ITEM	\bar{X}	S.D.	Level of appropriateness
1	Learning aspect	4.10	0.7	High
	1.1 Interactions in the classroom include changes in communication between classmates or teachers and students	3.97	0.81	High
	1.2 Flipped classroom self-study link, you can take the initiative to complete the tasks assigned by the teacher	4.13	0.68	High
	1.3 In the flipped classroom teaching, you can participate in the group discussions	4.20	0.61	High
2	Instructional strategy	4.16	0.69	High



	2.1 You completed the pre-class study task list on time	4.17	0.70	High
	2.2 You interact and communicate in class to enhance your ability of independent exploration and learning	4.00	0.59	High
	2.2 You interact and communicate in class to enhance your ability of independent exploration and learning	4.00	0.59	High
	2.3 You work with groups to learn in class to arouse enthusiasm and participation	4.30	0.65	High
	2.4 Teachers give personalized guidance to students	4.13	0.78	High
	2.5 Teachers' collective guidance strategy for existing problems	4.20	0.71	High
3	Teaching media aspect	4.22	0.73	High
	3.1 Compared with the traditional classroom, I like the flipped classroom teaching method	4.20	0.66	High
	3.2 You believe that you have mastered the content of the course activities provided to you by the teacher.	4.27	0.76	High
	3.3 With flipped classroom teaching, you can actively answer the teacher's questions	4.27	0.78	High
4	Assessment aspect	4.23	0.75	High
	4.1 The degree to which you think you have completed the learning task of the pre-class video	4.27	0.74	High
	4.2 In the flipped class, you can feel a deeper understanding of the knowledge points through the teacher's solution of the pre-class problems, the systematic teaching of the knowledge, and the discussion of the problems between the students	4.33	0.76	High
	4.3 You think using flipped classroom teaching will improve your grades	4.23	0.73	High
	4.4 You feel that flipped classroom teaching will deepen your understanding of what you are learning	4.10	0.76	High
	Overall Total	4.18	0.72	High

Explanation of mean score of student satisfaction:

- 1) 4.51-5.00 refers to very high level;
- 2) 3.51-4.50 refers to high level;
- 3) 2.51-3.50 refers to moderate level;
- 4) 1.51-2.50 refers to low level;



5) 1.00-1.50 refers to very Low level.

Based on the results, we can conclude as follows:

As shown in Table 3, the overall results of the flipped classroom method by experts are at very high level with ($\bar{X}=4.18$, S.D. = 0.72), and the results with each aspects were shown as follows:

Learning aspect by the total 1 results were at high level with ($\bar{X}= 4.10$, S.D. = 0.7), and each item were followed this: Interactions in the classroom include changes in communication between classmates or teachers and students at very high level ($\bar{X}=3.97$ S.D.=0.80), Flipped classroom self-study link, you can take the initiative to complete the tasks assigned by the teacher were at very high level with ($\bar{X}=4.13$ S.D.=0.68) and In the flipped classroom teaching, you can participate in the group discussions were at very high level with ($\bar{X}=4.20$ S.D.=0.61).

Instructional strategy by the results were at high level with ($\bar{X}= 4.16$, S.D. = 0.69), and each item were followed this: You completed the pre-class study task list on time at very high level ($\bar{X}=4.17$ S.D.=0.70), You interact and communicate in class to enhance your ability of independent exploration and learning were at very high level with ($\bar{X}=4.00$ S.D.=0.59), You work with groups to learn in class to arouse enthusiasm and participation were at very high level with ($\bar{X}=4.30$ S.D.=0.65), Teachers give personalized guidance to students were at very high level with ($\bar{X}=4.13$ S.D.=0.78) and Teachers' collective guidance strategy for existing problems were at very high level with ($\bar{X}=4.20$ S.D.=0.71).

Teaching media aspect by the results were high level with ($\bar{X}= 4.22$, S.D. = 0.73), and each item were followed this: Compared with the traditional classroom, I like the flipped classroom teaching method at very high level ($\bar{X}=4.20$ S.D.=0.66), You believe that you have mastered the content of the course activities provided to you by the teacher were at very high level with ($\bar{X}=4.20$ S.D.=0.76), and With flipped classroom teaching, you can actively answer the teacher's questions were at very high level with ($\bar{X}=4.27$ S.D.=0.78).

Assessment aspect by the results were at high level with ($\bar{X}= 4.23$, S.D. = 0.75), and each item were followed this: The degree to which you think you have completed the learning task of the pre-class video at very high level ($\bar{X}=4.27$ S.D.=0.74), In the flipped class, you can feel a deeper understanding of the knowledge points through the teacher's solution of the pre-class problems, the systematic teaching of the knowledge, and the discussion of the problems between the students were at very high level with ($\bar{X}=4.33$ S.D.=0.76), You think using flipped classroom teaching will improve your grades were at very high level with ($\bar{X}=4.23$ S.D.=0.73), and You feel that flipped classroom teaching will deepen your understanding of what you are learning were at very high level with ($\bar{X}=4.10$ S.D.=0.76).

Thus, it was concluded that, the students' satisfaction after being exposed to the flipped classroom method was high.



6. Discussion

The following points based on the research results were discussed:

6.1 The flipped classroom teaching method enables students to control their own learning progress, so that the learning needs of students at different levels can be satisfied, and the desire of hierarchical teaching can be realized. For example, students with good self-learning ability can quickly learn the knowledge points, so that they can save time to think about questions and other interesting knowledge, while students with weak self-learning ability can learn the video repeatedly until they master the knowledge according to their own degree. The biggest feature of flipped classroom is that it reclassifies the time in and out of the physical classroom, overturning the passive way of students receiving knowledge in the traditional classroom. Students learn new knowledge preliminarily through teaching micro-videos before class, while in class, they mainly complete the internalization of knowledge required by class standards (Schmidt, S.M.2016).

6.2 During the implementation of "flipped classroom", an important factor that cannot be ignored is whether students develop the habit of self-study. Flipped classroom allows limited class time to be allocated more rationally. As students learn relevant knowledge before class, teachers can spend more time in class to solve students' problems. In comparison, flipped classroom can more effectively visualize complex problems, make teachers more targeted in class content, and spend more time on students' weak points, thus making the distribution of classroom practice more reasonable (Liu Wei 2016).

6.3 Timely feedback of "pre-class learning task list" provides basis for classroom teaching. The "pre-class learning task sheet" is timely feedback to the students' self-study process. Therefore, teachers should attach great importance to it. No matter the feedback on the network platform or the problem communication in class, teachers need to summarize the "flipped classroom" because the difficult problems found in the "flipped classroom" will become the resources for teachers to interact in the classroom. Teachers design these questions as topics for group discussion and guide students to explore the answers to the questions through independent discussion and group work. Classroom interaction always focuses on solving key problems and improving the pertinence of classroom interaction. (Liu Jinfeng, 2018).

6.4 The implementation of flipped classroom in the classroom is the internalization of knowledge and the key to effectively improve students' learning efficiency. In this link, inter-group cooperation and teachers' question-answering are complementary. The teacher shows the remaining problems of each group to the students by PPT and leaves some discussion time for the students. Each group is invited to try to solve the problems of other groups. In-depth discussion with students, in the elaboration of the explanation at the same time with the corresponding exercises to consolidate, helps students to understand and remember. According to the completion of the learning plan, the teacher carefully sets up a series of questions, which are analyzed and discussed by teachers and students, and summed up the knowledge content of this class and the mathematics thought method involved (Liu Xiangyong.2016).



6.5 The samples' satisfaction with the flipped classroom was also found at the highest level (4.81). By independently watching teaching videos before class and completing the task list assigned by the teacher, the students had a sense of achievement in making breakthroughs step by step, which greatly improved the efficiency of pre-class preview and learning. In addition, the class atmosphere was very good, so that the students could learn a lot of knowledge happily and communicate with the group constantly. This makes students more interested in learning mathematics (Deng Xin 2013).

7. Conclusion

7.1 Mathematics achievement of the first-year students after being exposed to the flipped classroom method was higher than before at a statistically significant level of 0.05.

Group	N	Pretest scores		Posttest scores		t	p
		\bar{X}	S.D.	\bar{X}	S.D.		
Experimental group	30	15	1.60	22.00	1.46	29.20*	.000

$p < 0.05$

7.2 The mathematics achievement of the first-year students after being exposed to the flipped classroom method was higher than the criterion of 70% at the 0.05 statistical significance level ($\bar{X} = 22.00$ S.D. = 1.46).

Group	N	Full score	Criteria score	\bar{X}	S.D.	t	p
Experimental group	30	30	21	22.00	1.46	3.75*	0.000

$p < 0.05$

7.3 The satisfaction of students to the flipped classroom method was at a high level ($\bar{X} = 4.18$ S.D. = 0.72).

8. Recommendations

The following are some recommendations based on the research results:

8.1. Recommendation for implications

1) Teachers need to strengthen the knowledge of the flipped classroom method, strengthen theoretical learning, improve teaching ability, and earnestly complete the course preparation to make themselves have confidence during teaching.

2) In teaching, the flipped classroom method takes students as the main body and teachers as the lead to complete the teaching organization. Although the teacher is the guide, the teacher cannot leave the students alone, because the teacher guides the students to learn actively, so the students become the subject of learning.



3) In the practice of the flipped classroom method, teachers should guide students to actively learn the content of this lesson, and always keep supervision and guidance, so that students will not deviate from the topic during the learning process.

4) Flipped classroom method can effectively improve students' academic performance in the actual classroom teaching process. Therefore, if conditions permit, the flipped classroom method should be prioritized in the classroom.

8.2. Recommendation for further research

1) The practice time of flipped classroom method is relatively short and the number of lectures is limited. In order to better test the influence of flipped classroom on the cultivation of students, teachers also need to use the flipped classroom method to conduct more effective empirical research in the classroom for a long period of time.

2) This research is limited by our academic level and external resources, so there are still some deficiencies in the exploration of flipped classroom method, which needs further exploration and attempts in the later stage.

3) One school cannot represent all ordinary colleges and universities, so the flipped classroom method still needs to be verified in more ordinary colleges and universities so as to make the experimental results more convincing.

4) This study will continue to reflect on and improve the shortcomings of this practice in future flipped classroom teaching activities. In our opinion, with the continuous popularization of information technology and in-depth research, the value of flipped classroom will be more perfectly reflected in the future teaching.

Due to my limited time in practice and lack of experience in the initial stage of exploration, the research on the teaching model proposed based on the concept of flipped classroom is just the beginning. I will continue to make efforts on the implementation of flipped classroom in the future teaching, further improve the flipped classroom model, and provide reference for other teachers. Although flipped classroom is a new teaching model put forward in recent years, but still cannot be widely used. I hope the majority of educators can further explore and study flipped classroom model, change the traditional concept, conform to the trend of teaching reform, promote the development of our country. In a word, the researcher will continue to reflect on and improve the shortcomings of this practice in future flipped teaching activities. And the researcher believes that with the continuous popularization of information technology and the deepening of research, the value of flipped classroom will be more perfectly reflected in future teaching.

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Developing an English Reading Practice Handbook in ASEAN Context for Teachers in the Responsible Area of Dhonburi Rajabhat University in Bangkok

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Abstract

The objectives of this research were: 1) to investigate the English reading problems of English teachers in Dhonburi District which is in the responsible area of Dhonburi Rajabhat University and 2) to develop an English reading practice handbook in the ASEAN contexts for the English teachers in Dhonburi District. This research was considered as a kind of research and development one. The respondents in this research were ninety-four English teachers from seventy-seven schools (forty-four kindergartens, twenty-five primary schools and eight secondary schools) located in Dhonburi District. The research instrument employed in this study was a questionnaire. The information and data collected were analyzed through the content analysis method and presented in terms of mean values, standard deviation and Likert rating scales. The findings indicated that: 1) The English reading problems of English teachers in Dhonburi District which is in the responsible area of Dhonburi Rajabhat University in terms of vocabulary, grammar, reading techniques and technical terms or Jargon were all in the "Highest" level. 2) The English reading practice handbook in the ASEAN contexts for the English teachers in Dhonburi District comprises of nine units and each unit is composed of two or three reading passages followed with ten questions in each passage for learners to practice their writing skills. All the nine units evaluated by the five specialists (Three Thai professors and two English native speakers) in terms of correctness and suitability of the contents and possessed the IOC values from 0.8 to 1.0 meaning the developed English reading practice handbook in the ASEAN contexts for the English teachers was acceptable and could be used for the English teachers in Dhonburi District to enhance their English reading skills and competence.

Keywords: Developing, English Reading, Handbook, ASEAN Contexts,



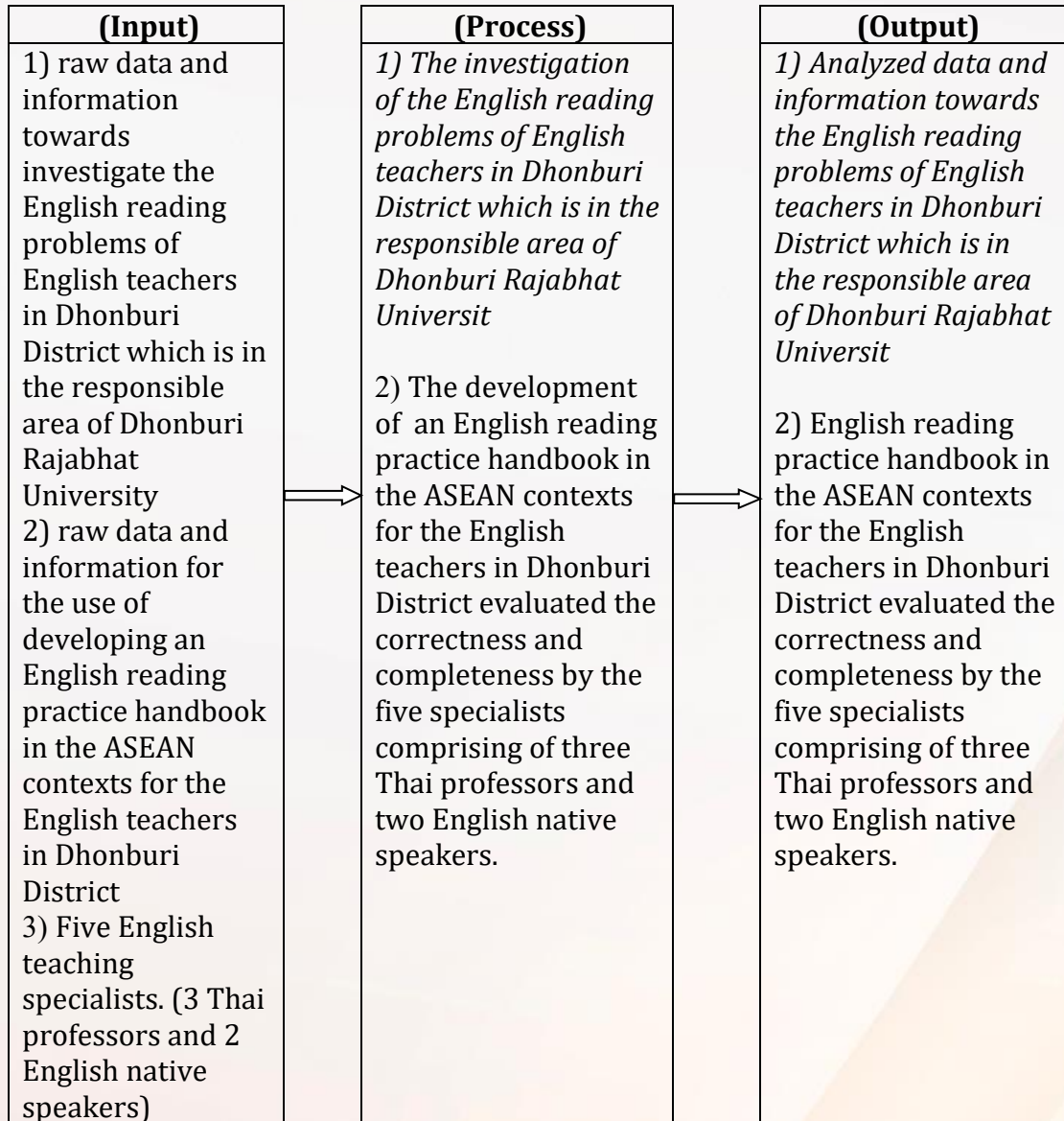
1. Rationale

It has been accepted that English is widely used for communication by people all around the world as a result of the differences among their native languages. English; therefore, has been considered International Language making understanding for daily use, education and working. (Kirkpatrick, 2007) According to the gathering of the ten nations in Southeast Asia causing the ASEAN Community, English has been used as the working language of ASEAN Community. Moreover, English has been considered an essential tool for searching knowledge and information from many types of resources especially in social networks. Therefore, the reading and writing competence, also called “Literacy”, of learners in the 21st Century of Education refers to as the abilities of learners to apply all types of technology as tool for communication and the access of various informative networks for education. English Proficiency; therefore, is considered a basic literacy which learners must be able to employ it as a tool for searching the knowledge from any various types of informative resources themselves, (NCREL, 2003). The English teachers must be responsible for the enhancement of English skills of their learners so that they are able to apply their English skills for effective communication and their life-long learning. According to the Ordinary National Educational Test (O-NET) of the three educational levels; namely, primary school (P. 6), junior high school (M. 3) and senior high school (M.6) for the Year 2020 organized by the Institute of National Educational Test of Thailand, it was indicated that the lowest English scores was lower than 30. The average English scores of P. 6, M.3 and M.6 were 43.55, 34.38 and 29.94 in succession. (The National Institute of Educational Testing Service, 2020) It can be concluded that the English competence of the Thai students in all three educational levels of Thailand is found in the low level. It can be assumed partly as a result of the lack of reading skills especially in the section of reading comprehension. It was found that most students spent quite long for doing the English test in this part. Most students were found the lack of main-point comprehension techniques and inadequate vocabulary. The English instructors; therefore, must have effective English skills for the enhancement of English teaching and learning system of the three education levels.

For these reasons, the research team conducted this research project in order to 1) investigate the English reading problems of English teachers in Dhonburi District which is in the responsible area of Dhonburi Rajabhat University and 2) develop an English reading practice handbook in the ASEAN contexts for the English teachers in Dhonburi District so that they can use and apply it for the effective English teaching and learning at their schools. In addition, the main purpose of using the ASEAN context in the English reading practice handbook is to encourage the English teachers to apply the information and knowledge obtaining from the reading passages to construct some essential life experiences for their students as well as enhance the knowledge level of their students' concerning arts and cultures of all nations in the ASEAN community. The students are able to learn and enhance their English reading skills through the stories as well as the identities of all countries in the ASEAN Community. (See the conceptual frame work as follows)



Conceptual Frame Work



2. Research Objectives

In this study, there were two research objectives as follows:

2.1 to investigate the English reading problems of English teachers in Dhonburi District which is in the responsible area of Dhonburi Rajabhat University

2.2 to develop an English reading practice handbook in the ASEAN contexts for the English teachers in Dhonburi District

3. Research Methodology

3.1 Population/Samples



To investigate the English reading problems of English teachers in Dhonburi District which is in the responsible area of Dhonburi Rajabhat University, The Ninety-four English teachers from both public and private schools located in Dhonburi District were employed as research respondents. The Ninety-four English teachers from the seventy-seven schools (forty-four kindergartens, twenty-five primary schools and eight secondary schools) were mailed the questionnaires and informed the date of picking up the questionnaires by the research team themselves.

3.2 Research Instruments

The ninety-four copies of the questionnaire for collecting the data and information for the investigation of the English reading problems of English teachers in Dhonburi District which is in the responsible area of Dhonburi Rajabhat University. The questionnaires were constructed according to the review of other relevant research papers and the theories of constructing questionnaires from other related textbooks both in Thai and English. The questionnaires were approved in terms of correctness and suitability of the contents by the five specialists (Three Thai professors and two English native speakers). All items in the questionnaire possessed the IOC (Index of Congruence) value of 0.66 or more, which were acceptable for being used to collect data and information of this research.

3.3 Data Collection

3.3.1 To collect the data and information for the investigation of the English reading problems of English teachers in Dhonburi District which is in the responsible area of Dhonburi Rajabhat University, the research team themselves as well as their assistants mailed the questionnaire to all The Ninety-four English teachers from both public and private schools located in Dhonburi District were employed as research respondents. The Ninety-four English teachers from the seventy-seven schools (forty-four kindergartens, twenty-five primary schools and eight secondary schools) were mailed the questionnaires and informed and informed them the purposes as well as the benefits to be gained from this research study, setting the appointment dates and time to pick up the questionnaire and interview for further information.

3.3.2 To develop the English reading practice handbook in the ASEAN contexts for the English teachers in Dhonburi District in terms of correctness and suitability of the contents by the five specialists (three Thai professors and two English native speakers), three focus group meetings were organized. The five specialists in English teaching were invited to attend the meetings and evaluated the correctness and suitability of the contents the handbook. All units in the questionnaire possessed the IOC (Index of Congruence) value of 0.66 or more, which were acceptable for being used as an English reading practice handbook in the ASEAN contexts for the English teachers in Dhonburi District.

3.4 Data Analysis

The information and data collected were analyzed through the content analysis method and presented in terms of frequency count and percentage as follows:



3.4.1 The English reading problems of English teachers in Dhonburi District which is in the responsible area of Dhonburi Rajabhat University were analyzed and presented in terms of the means value (\bar{x} and S.D.) and level of problems according to Likert Ranking Scales.

3.4.2 All units of English reading practice handbook in the ASEAN contexts were evaluated in terms of correctness and suitability of the contents and presented in terms of IOC (Index of Congruence) value.

4. Research Results

4.1 The English reading problems of English teachers in Dhonburi District which is in the responsible area of Dhonburi Rajabhat University

Table 1: The English reading problems of English teachers in Dhonburi District

Questions	n = 94		Level of Problems
	\bar{x}	S.D.	
Vocabulary			
1) I don't know the meanings of most of unfamiliar words found in the reading passages	4.96	0.20	Highest
2) I cannot guess the meanings of the unfamiliar words through the context of the reading passages	4.56	0.50	Highest
3) I cannot guess the meanings of the unfamiliar words through the word roots	4.56	0.58	Highest
4) The unfamiliar words found in the reading passages are too difficult and over my knowledge levels causing the incomprehension of the reading passages	4.88	0.33	Highest
5) I am very confused the different meanings of the unfamiliar words in terms of American and British English causing the incomprehension of the reading passages	4.64	0.48	Highest
Grammar			
1) I don't understand the reading passages due to the complicated structures	4.92	0.27	Highest
2) My knowledge of English structures is not enough causing the incomprehension of the reading passages	4.96	0.20	Highest
3) I cannot analyze the details of the reading passages since I cannot remember the English grammar rules	4.96	0.20	Highest
4) I don't understand the details of the reading passages due to the confusion of the American and British Writing styles	4.68	0.47	Highest



5) I cannot understand the situation of the reading passages due to the lack of knowledge concerning the transitional words and punctuations	4.52	0.50	Highest
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Reading Techniques

1) I spend long and repeat several times for reading to understand the passages	4.80	0.40	Highest
2) I cannot organize the orders or the sequences of the reading passages systematically	4.88	0.33	Highest
3) I cannot comprehend the main points of the reading passages in a short time	4.92	0.27	Highest
4) I cannot apply the scanning technique for reading passages effectively	4.84	0.37	Highest
5) I cannot apply the skimming technique for reading passages effectively	4.76	0.43	Highest

Technical Terms / Jargon

1) My knowledge of technical terms in the fields of medicine and public health is limited	4.80	0.40	Highest
2) My knowledge of technical terms in the fields of science, technology and engineering is limited	4.96	0.20	Highest
3) My knowledge of technical terms in the fields of political science and laws	4.84	0.37	Highest
4) My knowledge of technical terms in the fields of arts, cultures, humanities and social scienecer is limited	4.60	0.50	Highest
5) My knowledge of technical terms in the fields of management and business is limited	4.76	0.43	Highest

Total	4.77	0.16	Highest
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According to table 1, it was indicated that the English reading problems of English teachers in Dhonburi District which is in the responsible area of Dhonburi Rajabhat University in terms of vocabulary, grammar, reading techniques and technical terms or Jargon were all in the “Highest” level.

4.2 The English reading practice handbook in the ASEAN contexts for the English teachers in Dhonburi District comprises of nine units; namely, 1) The Story of Singapore’s National Mascot 2) Malaysia’s Favourite Nasi Kandar Restaurant 3) Call Center Outsourcing, A New Philippines Success Story 4) The Invisible Graffiti of Angkor Wat 5) Quite Interesting facts about Indonesia 6) Water Puppetry in Vietnam 7) A Brief History of the Grand Palace in Bangkok 8) Temple of Reclining Buddha: Wat Pho in Bangkok and 9) Top 10 Useful Bangkok Tips Good things to know when travelling in. Each unit is composed of two or three reading passages and each passage is followed with ten questions for learners to practice their writing skills. All the nine units evaluated by the five specialists (Three Thai



professors and two English native speakers) in terms of correctness and suitability of the contents and presented in terms of IOC (Index of Congruence) values. All nine units were evaluated and possessed the IOC values from 0.8 to 1.0 meaning the developed English reading practice handbook in the ASEAN contexts for the English teachers was acceptable and could be used as an English reading practice handbook in the ASEAN contexts for the English teachers in Dhonburi District to enhance their English reading skills and competence.

Table 3

The Index of Congruence (IOC) of the nine units as well as the three parts in each unit in terms of correctness and suitability of the contents

Topics/Contents	IOC
Unit 1: The Story of Singapore's National Mascot	
1. Passage 1: The Story of Singapore's National Mascot – Where Did The Merlion Come From?	0.8
2. Passage 2: Five Reasons to Visit Myanmar	0.8
Unit 2: Malaysia's Favourite Nasi Kandar Restaurant	
Passage 1: Malaysia's Favourite Nasi Kandar Restaurant	0.8
Passage 2: Myanmar, the Sea of Pagodas	0.8
Passage 3: Suvannaphoum, the Golden Land	1.0
Unit 3: Call Center Outsourcing, A New Philippines Success Story	
Passage 1: Call Center Outsourcing, A New Philippines Success Story	0.8
Passage 2: Miss Saigon, Musical Play	1.0
Unit 4: The Invisible Graffiti of Angkor Wat	
Passage 1: The Invisible Graffiti of Angkor Wat	0.8
Passage 2: The culture and traditions of Laos	0.8
Unit 5: Quite Interesting facts about Indonesia	0.8
Passage 1: Quite Interesting facts about Indonesia	0.8
Passage 2: World's Largest Palace: Istana Nurul Iman, Brunei	
Unit 6: Water Puppetry in Vietnam	
Passage 1: Water Puppetry in Vietnam	1.0
Passage 2: Prepare yourself to get ready for AEC 2015: What is AEC	8.0
Unit 7: A Brief History of the Grand Palace in Bangkok	
Passage 1: A Brief History of the Grand Palace in Bangkok	8.0
Passage 2: Temple of Dawn: Wat Arun in Bangkok	8.0
Unit 8: Temple of Reclining Buddha: Wat Pho in Bangkok	
Passage 1: Temple of Reclining Buddha: Wat Pho in Bangkok	1.0
Passage 2: Khaosan Road	8.0
Unit 9: Top 10 Useful Bangkok Tips Good things to know when travelling in Bangkok	
Passage 1: Top 10 Useful Bangkok Tips Good things to know when travelling in Bangkok	8.0
Passage 2: Siam Paragon Bangkok Shopping Centre	1.0



According to table 2, it was indicated that all the nine units evaluated by the five specialists (Three Thai professors and two English native speakers) in terms of correctness and suitability of the contents and presented in terms of IOC (Index of Congruence) were found 0.8 or more, which were acceptable for being used as an English reading practice handbook in the ASEAN contexts for the English teachers in Dhonburi District to enhance their English reading skills and competence.

5. Discussion

5.1 The English reading problems of English teachers in Dhonburi District which is in the responsible area of Dhonburi Rajabhat University

The findings from the investigation of The English reading problems of English teachers in Dhonburi District which is in the responsible area of Dhonburi Rajabhat University in terms of vocabulary, grammar, reading techniques and technical terms or Jargon were all in the “Highest” level indicating that the English instructors in the three educational levels; namely, kindergarten level, primary school level and secondary school level in Dhonburi District possessed low level of competence in English reading skills. These problems might be resulted from the lack of English reading practice. The results were found to correspond with the ones of TanakornSuwanprut and Attapon Siriwan (2020) in those students in undergraduate program possessed low level skill of English reading for comprehension. The students were suggested to practice their reading skill through online lessons together with off-line learning in the class room. The students were suggested to practice the application of suitable techniques to enhance their reading skills as well as to provoke their concerns towards the application of suitable reading techniques emphasizing on the metacognition process which is the major part of effective reading skill enhancement.

5.2 The English reading practice handbook in the ASEAN contexts for the English teachers in Dhonburi District

The contents in each unit focusing on the English reading passages extracted from referable and reliable sources and were then simplified to be suitable for the knowledge level of Thai learners. The part of reading and writing skill practice in The English reading practice handbook in the ASEAN contexts for the English teachers in Dhonburi District focus on practicing and enhancing reading skill for comprehension as well as writing skill of describing the details and information from the passage or the article correctly and clearly. The contents of all passages encourage the propagation of Thai and ASEAN arts and cultures which the learners are familiar. The learners must be able to apply the knowledge obtained from the reading passages to the real situations. The learning activities in the part of reading and writing skills comply with one of the traditional methods which is The Grammar Translation Method by encouraging learners to understand and memorize the English grammar rules as well as English vocabulary. In addition, this part provides some questions concerning the reading passages for the learners to practice writing skill. This is correspondent with Allen (1983) in that practicing reading and writing skills through the Grammar Translation Method encourage learners to study English grammar rules and vocabulary. This helps the



learners practice and develop their intelligence and competency in English language.

5.3 Recommendations for Further Study

1) Research on the evaluation towards the effectiveness of the English reading practice handbook in the ASEAN contexts for the English teachers in Dhonburi District must be executed.

2) Research on factors affecting the competence of English reading competence of the English teachers in Dhonburi District must be executed must be executed.

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Developing an English Grammar Review Handbook to Enhance Writing Skill for Teachers in the Responsible Area of Dhonburi Rajabhat University in Bangkok

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Abstract

The objectives of this research were: 1) to investigate problems of using English grammar for writing of English teachers in schools located in Dhonburi district of Bangkok and 2) to develop an English grammar review handbook to enhance writing skill. This research was considered a kind of research and development one. The respondents in this research were ninety-four English teachers of thirty-seven schools located in Dhonburi district of Bangkok. The research instrument employed in this study was a questionnaire. The information and data collected were analysed and presented in terms of frequency count and percentage. The findings indicated that: 1) The problem of the English teachers for using English grammar for writing was found in the highest degree level. 2) The English grammar review handbook to enhance writing skill comprises of nine units; namely, a) Tense Review: The Simple Present and The Present Continuous b) Tense Review: The Simple Past and The Past Continuous c) Tense Review: The Present Perfect and The Present Perfect Continuous d) Tense Review: The Past Perfect and The Past Perfect Continuous e) Tense Review: The Simple Future and The Future Continuous f) Active Voice and Passive Voice Review g) Simple, Compound, and Complex Sentences Review h) Positive and Negative Sentences Review and i) Questions and Questions Tags Review. Each unit consists of grammar Review and writing exercises. All the nine units were evaluated by the five specialists in terms of correctness and suitability of the contents and presented in terms of IOC (Index of Congruence) value were found from 0.8 to 1.0, which were acceptable for being used as an English grammar review handbook to enhance writing skill.



Keywords: Developing, English Grammar Review Handbook, Writing Skill, Teacher

1. Rationale

It is known that English plays an important role for people around the world to use for communication in politics, economy, education, and other areas. With the significance of English as the Lingua Franca in mind, Canale and Swain (1980) stated that knowledge and understanding of grammar rules is important in developing accuracy in language use. Moreover, Dickins and Woods (1988) stated that without grammar knowledge, those who learn English as a second language will not understand and will not be able to communicate at a high level. Grammar is a tool for helping to communicate successfully, and it is the most important component in the use of English efficiency in all skills; including, listening, speaking, reading, and writing. Therefore, it can be concluded that grammar is the fundamental factor of language usage patterns for users or learners of that language how to speak or write. Learners should be trained to memorize and be able to use the language in real-life situations by using the grammar to develop all four communication skills which are the main aim of learning English. For this reason, in teaching and learning, instructors need to teach the rules of grammatical structures in detail and with accuracy (Burgess and Etherington, 2002; Potgieter and Conradie, 2013).

According to four language skills, Pornsawan (2007) mentioned that written language is the most complex skill. Listening and reading are merely receptive skills whereby information is received by the mind through interpretation and analysis. However, communication through writing is a truly powerful way to attract the attention of the reader. Writing is a process of gathering knowledge and information on many aspects such as grammar structure, vocabulary, expressions, ideas, and creativity, etc.

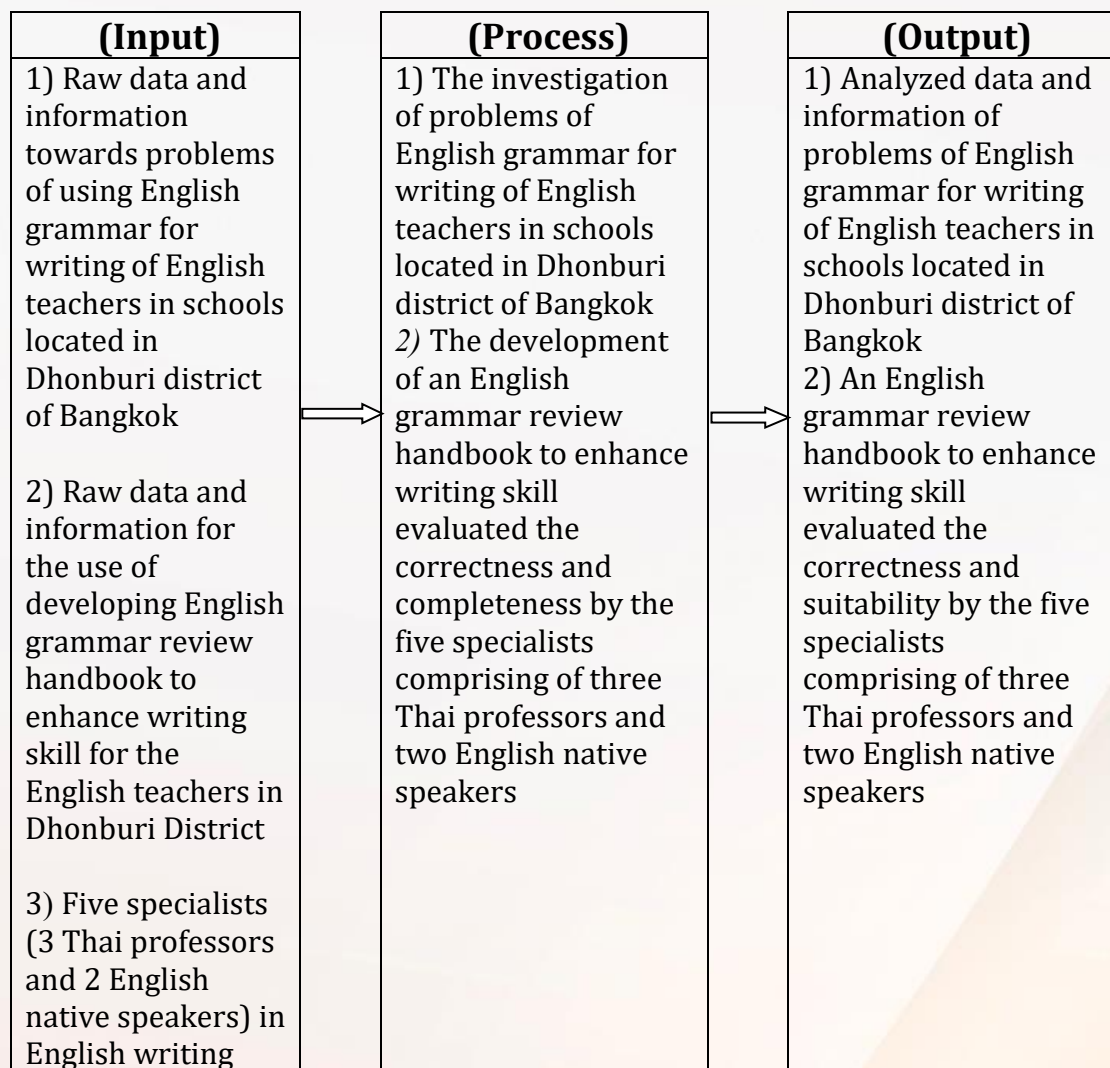
In addition, according to the Ordinary National Educational Test (O-NET) of the three educational levels; namely, primary school (P. 6), junior high school (M. 3) and senior high school (M.6) for the Year 2020 organized by the Institute of National Educational Test of Thailand, it was indicated that the lowest English scores was lower than 30. The average English scores of P. 6, M.3 and M.6 were 43.55, 34.38 and 29.94 in succession. (The National Institute of Educational Testing Service, 2020). It can be concluded that the English competence of the Thai students in all three educational levels of Thailand is found in the low level. It can be assumed partly as a result of the lack of practicing especially in English grammar for writing. It was found that most students were lack of English grammar comprehension. The English instructors; therefore, must have effective English grammar knowledge for the enhancement of English teaching and learning system of the three education levels.

For these reasons, the researcher was interested in the investigation of the problems of using English grammar for writing and the development of the English grammar review handbook to enhance writing skill. The result of this study was the English grammar review handbook to be used by the English teachers in schools located in Dhonburi district of Bangkok, so that they can review on the grammar with many examples together with writing exercises, and



they can use it to be part of their teaching. (See the conceptual framework as follows)

Conceptual Frame Work



2. Research Objectives

In this study, there were two research objectives as follows:

2.1 to investigate problems of using English grammar for writing of English teachers in schools located in Dhonburi district of Bangkok

2.2 to develop an English grammar review handbook to enhance writing skill

3. Research Methodology

3.1 Samples

To investigate of problems of English grammar for writing of English teachers in schools located in Dhonburi district of Bangkok, the ninety-four English teachers from thirty-seven both public and private schools were employed as



research respondents. The thirty-seven schools were selected according to the location in the responsible area of Dhonburi Rajabhat University in Bangkok. All ninety-four English teachers from thirty-seven schools in Dhonburi area were mailed the questionnaires and informed the date of picking up the questionnaires by the research team themselves.

3.2 Research Instruments

1) ninety-four copies of the questionnaire for collecting the data and information from the investigation of problems of English grammar for writing of English teachers in schools located in Dhonburi district of Bangkok. The questionnaires were constructed according to the review of other relevant research papers and the theories of constructing questionnaires from other related textbooks both in Thai and English. The questionnaires were approved in terms of correctness and suitability of the contents by the five specialists (Three Thai professors and two English native speakers). All items in the questionnaire possessed the IOC (Index of Congruence) value from 0.8 to 1.0, which were acceptable for being used to collect data and information of this research.

3.3 Data Collection

3.3.1 To collect the data and information from the investigation of problems of English grammar for writing of English teachers in schools located in Dhonburi district of Bangkok, the researcher team mailed the questionnaire to all ninety-four English teachers from thirty-seven both public and private schools located in Dhonburi district of Bangkok informing the purposes as well as the benefits to be gained from this research study, setting the appointment dates and time to pick up the questionnaire and interview for further information.

3.3.2 To develop the English grammar review handbook to enhance writing skill in terms of correctness and suitability of the contents by the five specialists (three Thai professors and two English native speakers), three focus group meetings were organized. The five specialists in English teaching were invited to attend the meetings and evaluated the correctness and suitability of the contents the handbook.

3.4 Data Analysis

The information and data collected were analysed through the content analysis method and presented in terms of frequency count and percentage as follows:

3.4.1 The general information in data of the ninety-four English teachers were analysed and presented in terms of frequency count and percentages, for gender, age, and education level.

3.4.2 The problems of English grammar for writing of English teachers in schools located in Dhonburi district of Bangkok were analysed and presented in terms of the means value (\bar{x} and S.D.) and level of problems according to the questions in the questionnaire.



3.4.3 The evaluation of all the nine units were evaluated in terms of correctness and suitability of the contents and presented in terms of IOC (Index of Congruence) value.

4. Research Results

4.1 The problems of English grammar for writing of English teachers in schools located in Dhonburi district of Bangkok

Table 1

Means and Standard Deviation of problems of English grammar for writing of English teachers in schools located in Dhonburi district of Bangkok

Questions	n = 94		Level of Problems
	\bar{x}	S.D.	
1) Difficulty in distinguishing and selecting between nouns and pronouns	4.96	0.20	Highest
2) Difficulty in distinguishing and selecting between adverbs and adjectives	4.56	0.50	Highest
3) Difficulty in distinguishing and selecting prepositions	4.56	0.58	Highest
4) Difficulty in choosing question words to be appropriate with the question	4.88	0.33	Highest
5) Difficulty in selecting verbs to be appropriate with the context	4.64	0.48	Highest
6) Difficulty in selecting present simple tense to be appropriate with the context	4.68	0.47	Highest
7) Difficulty in selecting present continuous tense to be appropriate with the context	4.92	0.27	Highest
8) Difficulty in selecting present perfect tense to be appropriate with the context	4.96	0.20	Highest
9) Difficulty in selecting past simple tense to be appropriate with the context	4.96	0.20	Highest
10) Difficulty in selecting future tense to be appropriate with the context	4.68	0.47	Highest
11) Confusion in using relative pronoun in connecting sentences	4.52	0.50	Highest
12) Confusion in using conjunction in connecting sentences	4.80	0.40	Highest
13) Confusion in using participial phrase in connecting sentences	4.88	0.33	Highest
14) Confusion in using punctuation in connecting sentences	4.92	0.27	Highest
15) Confusion in using transitional words in connecting sentences	4.84	0.37	Highest
16) Having problems to understand simple, compound, and complex sentences	4.76	0.43	Highest



17) Having problems to understand passive voice and active voice	4.80	0.40	Highest
18) Having problems to understand if-clause structures to be appropriate with the context	4.92	0.27	Highest
19) Having problems to understand positive and negative forms to be appropriate with the context	4.96	0.20	Highest
20) Having problems to make questions to be appropriate with the context	4.84	0.37	Highest
Total	4.80	0.36	Highest

According to table 1, it was indicated that the problems of English grammar for writing of English teachers in schools located in Dhonburi district of Bangkok in terms of parts of speech and word choices, tenses, connecting sentences and paragraphs, and sentence structures were in the “Highest” level.

4.2 The English grammar review handbook to enhance writing skill comprises of nine units; namely, a) Tense Review: The Simple Present and The Present Continuous b) Tense Review: The Simple Past and The Past Continuous c) Tense Review: The Present Perfect and The Present Perfect Continuous d) Tense Review: The Past Perfect and The Past Perfect Continuous e) Tense Review: The Simple Future and The Future Continuous f) Active Voice and Passive Voice Review g) Simple, Compound, and Complex Sentences Review h) Positive and Negative Sentences Review and i) Questions and Questions Tags Review. Each unit consists of grammar Review and writing practice. All the nine units evaluated by the five specialists (Three Thai professors and two English native speakers) in terms of correctness and suitability of the contents and presented in terms of IOC (Index of Congruence) value.

Table 2

The Index of Congruence (IOC) of the nine units in terms of correctness and suitability of the contents

Topics/Contents	IOC
Unit 1: Tense Review: The Simple Present and The Present Continuous	
1. The Simple Present Tense	0.8
2. The Present Continuous Tense	0.8
3. Writing practice: The Simple Present Tense	1.0
4. Writing practice: The Present Continuous Tense	0.8
Unit 2: Tense Review: The Simple Past and The Past Continuous	
1. The Simple Past Tense	0.8
2. The Past Continuous Tense	0.8
3. Writing practice: The Simple Past Tense	1.0
4. Writing practice: The Past Continuous Tense	0.8
Unit 3: Tense Review: The Present Perfect and The Present Perfect Continuous	
1. The Present Perfect Tense	0.8



2. The Present Perfect Continuous Tense	1.0
3. Writing practice: The Present Perfect Tense	1.0
4. Writing practice: The Present Perfect Continuous Tense	
Unit 4: Tense Review: The Past Perfect and The Past Perfect Continuous	
1. The Past Perfect Tense	0.8
2. The Past Perfect Continuous Tense	0.8
3. Writing practice: The Past Perfect Tense	1.0
4. Writing practice: The Past Perfect Continuous Tense	1.0
Unit 5: Tense Review: The Future and The Future Continuous	
1. The Future Tense	0.8
2. The Future Continuous Tense	0.8
3. Writing practice: The Future Tense	0.8
4. Writing practice: The Future Continuous Tense	1.0
Unit 6: Active Voice and Passive Voice Review	
1. The Active Voice	0.8
2. The Passive Voice	1.0
3. Writing practice: The Active Voice	0.8
4. Writing practice: The Passive Voice	0.8
Unit 7: Simple, Compound, and Complex Sentences Review	
1. The Simple Sentence	1.0
2. The Compound Sentence	0.8
3. The Complex Sentence	0.8
4. Writing practice: The Simple Sentence	0.8
5. Writing practice: The Compound Sentence	1.0
6. Writing practice: The Complex Sentence	1.0
Unit 8: Positive and Negative Sentences Review	
1. The Positive Sentence	0.8
2. The Negative Sentence	0.8
3. Writing practice: The Positive Sentence	1.0
4. Writing practice: The Negative Sentence	1.0
Unit 9: Questions and Questions Tags Review	
1. The Questions	0.8
2. The Questions Tags	1.0
3. Writing practice: The Questions	1.0
4. Writing practice: The Questions Tags	1.0

According to table 2, it was indicated that all the nine units evaluated by the five specialists (Three Thai professors and two English native speakers) in terms of correctness and suitability of the contents and presented in terms of IOC (Index of Congruence) were found from 0.8 to 1.0, which were acceptable for being used as an English grammar review handbook to enhance writing skill.

5. Discussion

5.1 The problems of English grammar for writing of English teachers in schools located in Dhonburi district of Bangkok



The findings from the investigation of the problems of English grammar for writing of English teachers in schools located in Dhonburi district of Bangkok, according to the twenty questions, were in the “Highest” level, indicating that English teachers still had inadequate knowledge and ability to use English grammar for writing. These problems might have resulted from a lack of practice for expertise that agreed with Derewianka (2008) stated that if the learner has knowledge and accuracy in using grammar, it will help the learner to think critically and evaluate to use of words and be able to use proper grammar in writing. In addition, Pornsawan (2007) mentioned that learners use the language correctly, fluently, and appropriately, so they must have the opportunity to continuously practice their language skills which will provide the basis of their ability to read and write at a higher level.

5.2 The English grammar review handbook to enhance writing skill for English teachers in school located in Dhonburi District of Bangkok

The contents in each unit of the handbook complied with the review of the grammar with many examples together with writing practice for enhancing writing skill. The main purpose of learning English is to practice and enhance the competence of learners’ skills. English learners need to know the language structures, meanings, and functions of the language. Therefore, the learners must know various types of English structures with different functions and must be able to select the correct structures of English suitable for each situation as well. This is correspondent with Brookes and Withrow’s writing process model which starts to practice copying sentences correctly to match with the original sentences and then changing them to the form of words like nouns, pronouns, verbs, and tenses of sentences to the learning process. This helps the learners practice and develop their understanding and competency in the English language.

5.3 Recommendations for Further Study

1) Research on developing of online training on English grammar review for English teachers in schools located in Dhonburi district of Bangkok must be executed.

2) Research on developing an English grammar review handbook to enhance English communication skill for English teachers in schools located in Dhonburi district of Bangkok must be executed.

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Using Teaching Proficiency through Reading and Storytelling to Improve English Speaking Ability of Prathomsuksa 5 Students

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Abstract

The purposes of this research were to study and compare students' speaking ability before and after learning English speaking using Teaching Proficiency through Reading and Storytelling and to study the students' attitude towards learning English speaking using Teaching Proficiency through Reading and Storytelling. 25 Prathomsuksa 5 students from Bankokkhorkokpho School, Nong Bua Lamphu Primary Education Service Area Office 2, were chosen for the sample using cluster random sampling. The research design chosen was a one-group pretest-posttest. The research instruments were 12 lesson plans, an English-speaking test, and a questionnaire about the attitude towards teaching English speaking ability using Teaching Proficiency through Reading and Storytelling. The experiment lasted for a total of 12 weeks, with 2 hours per week. mean, percentage, standard deviation, one-sample t-test, and t-test for dependent samples were the statistics employed in this research. The mean scores of pretest and posttest were 107.19, or 35.73 %, and 225.11, or 75.04 %, respectively. The students' posttest mean score on English speaking was higher than the set criterion of 70 % and the students' English-speaking ability after the experiment was significantly higher than that of the pretest. The students' attitude towards Teaching Proficiency through Reading and Storytelling to teach English speaking was at a good level.

Keywords: Teaching Proficiency through Reading and Storytelling, English speaking ability, Prathomsuksa 5 Students.

1. Introduction

English is a widely used language of communication around the world. Nowadays, English plays a role in every aspect of life. Whether it is social, economic, political, or educational. The importance of the English language is that it is a tool of communication, education, knowledge acquisition, occupation, and building an understanding of the culture and vision of the global community. Learning English is very important and necessary in everyday life (Ministry of Education, 2008). Therefore, people with a good level of knowledge of the English language are at an advantage in applying their proficiency to bring benefits and appropriateness, which will lead to the development of knowledge and competence at a higher level, including exchanging knowledge with the world's societies of such importance. This has recognized the importance of teaching English that focuses on students' ability to use English to communicate effectively and be able to access various types of knowledge easily and more extensively. In



addition, the ASEAN Community (ASEAN Economic Community: AEC), where Thailand is one of the 10 member states, has also set a direction that cooperation between member countries must use English to communicate. When learning English, it is critical to focus on all four skills, not just the national language.

According to Celce-Murcia (2001), English is for elementary school students. Speaking skills are a skill that should be highly encouraged because, even if they have been practicing speaking since elementary school, students' ability to speak English fluently will be more effective. And it is a skill that can be used in daily life that provides a foundation for being able to use English to communicate all over the world. This leads to broad learning in many areas, such as education, the economy, society, politics, culture, etc. Speaking skills in English show how well you can learn and how good you are at speaking English (Graddol, 2006). Therefore, it is included in the academic curriculum of schools around the world, and over the centuries, it has been shown that people with English proficiency tend to have a better chance of competing than others. However, when it comes to the context of language education in Thailand, where English is a foreign language only, in the English Proficiency Index (EF English Proficiency Index, 2016), it was found that Thailand was ranked lower than many ASEAN countries in terms of English-speaking skills. It is also classified as one of the countries that has a lower level of English-skills required for use. And the result is that Thailand's English proficiency ranking amongst non-English speakers has fallen for the fourth consecutive year. According to the results of the English Proficiency Index, which was released in 2020 by a Swiss-based international education company (EF Proficiency Index, 2020), Thailand ranked in just the 89th place out of the hundred countries surveyed. With an overall score of just 419, Thailand is regarded as having "very low proficiency." This year's ranking is the lowest for Thailand, and it's the fourth year in a row that Thailand's ranking has gone down.

Moreover, this is also evident from the results of the Ordinary National Educational Test (O-Net), Grade 6, English for the year 2015 at the national level, with an average score of 40.31. According to the National Educational Testing Institute (NIETS, 2016), there was a further decline in 2016 with an average score of 34.59, and the National Educational Testing Institute (NIETS, 2017) observes that most of the teaching is based on learning that focuses on reading, writing, and grammar first. and then practice speaking skills. As a result, students are worried and afraid of making grammatical mistakes or fear that grammatical mistakes will be insulted. Some people feel embarrassed to be the focus of their classmates. All these factors contribute to a lack of confidence in speaking English. According to Murni (2012: 2), the English-speaking students can be considered as the main problem that causes students' lack of speaking ability. Students are even more worried about making grammatical mistakes when speaking in front of a class. Therefore, in helping students to improve their speaking ability, it is important to optimize the teaching and learning process to motivate students to learn and to feel relieved when speaking English. Guidelines and techniques should be used to make the classroom interesting and provide the lessons to make students feel relaxed, to help with teaching, and to let students use natural spoken language (Tuan & Mai, 2015). Therefore, the study of English speaking ability and learning problems in Thailand and the importance of teaching methods found that many



educators have proposed interesting ideas about the use of storytelling in teaching. Storytelling is an activity that not only helps develop the ability to listen but also develops the English-speaking ability of the students as well.

Bankokkhorkokpho School is a major government school in Nong Bua Lamphu Province's Naklang District, with kindergarten and elementary school management. Most of the English teachers are Thai, and they rely on textbooks instead of allowing students to practice using the target language. And the students are uninterested in what they have only learned from the textbook because it is insufficiently motivating. This makes students unable to use English to communicate. As a result, this is a contributing factor to the English language barrier among students. On the other hand, they have difficulty speaking English in the context of learning English as a foreign language, which is where the research will be conducted. Students are generally hesitant to express themselves in a foreign language. They are frequently concerned about making mistakes, apprehensive, or simply shy about attracting attention with their words. According to the academic affairs of Bankokkhorkokpho School's learning achievement report, the outcome of learning achievement for English was 48.53 percent as released from the learning achievement of Prathomsuksa 5 students in the academic year 2021 (Prathomsuksa 5 students mean the students in Grade 5). One of the reasons for low English learning achievement and students' inability to utilize English to communicate with others in their daily lives could be a lack of confidence in English speaking. According to Harmer (2007), one of the causes of students' lack of interaction in English classes is that professors play a larger role than students in steering the class through the use of the teaching center. Additionally, several factors contribute to the difficulty of teaching and learning to speak. To begin with, teachers always begin English instruction with a book. Students are instructed to repeat and recite the words in addition to taking dictation. When it comes to teaching and learning methods, teachers rarely use novel techniques or approaches. According to the Ministry of Education (2002), students will learn English more cheerfully and with greater engagement if the teacher makes the sessions more varied and enjoyable. Thus, in accordance with the Ministry of Education's policy regarding the teaching and learning of students' English-speaking abilities, the Teaching Proficiency through Reading and Storytelling method is one in which students can learn a variety of English while having fun. It was an extremely enjoyable and engaging educational experience. Specifically, by learning English so that you can communicate with others. According to Ray & Seely (2015), the most critical aspect of Teaching Proficiency through Reading and Storytelling is that students retain grammatical features and vocabulary. Students acquire the language in an enjoyable manner that enables them to communicate.

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with the Ministry of Education's policy regarding the teaching and learning of students' English speaking abilities, the Teaching Proficiency through Reading and Storytelling method is one in which students can learn a variety of English while having fun. It was an extremely enjoyable and engaging educational experience. Specifically, by developing English-speaking skills in order to communicate with others. The most critical aspect of Teaching Proficiency through Reading and Storytelling is that students retain grammatical features and vocabulary.

Students acquire the language in an enjoyable manner that enables them to communicate. As previously the main innovation of Teaching Proficiency through Reading and Storytelling as focused on storytelling and combining several techniques from Asher's classical Total Physical Response with Stephen Krashen's theories of language acquisition. This blends as a result of the storytelling process. There are numerous advantages to Teaching Proficiency through Reading and Storytelling. The most important aspect is that students remember the grammatical features as well as the words. They will receive sufficient exposure through total physical response to be able to remember and speak the language. They can also learn grammar and vocabulary by telling stories. The steps for teaching competency through reading and storytelling are as follows. They are the stages of figuring out what to mean, inquiring about the story, and reading it. The teacher gestures the meaning, personalizes it, and asks several questions in the first few phases. The teacher then asks the students to act as actors and perform while the teacher tells the story. In the last step, the children will speak and perform the story from their own point of view (Ray & Seely, 2015).

From the above-mentioned information, the researcher has been persuaded that developing students' English speaking abilities by using Teaching Proficiency through Reading and Storytelling might help students with difficulties in speaking English. Therefore, the researcher would like to employ the steps of teaching English speaking by Burns (2012: 172) and Teaching Proficiency through Reading and Storytelling by Ray and Seely (2015: 35) with the Prathomsuksa 5 students at the Bankokkhorkokpho School. The researcher would like to find out whether these methods could assist the students in improving their English speaking ability and to investigate the students' attitude toward learning English speaking ability using Teaching Proficiency through Reading and Storytelling. Furthermore, the results from this study could be used in the future as guidelines for English teachers teaching English in Thai schools.

2. Research Questions

The research questions were as follows:

1. Does Teaching Proficiency through Reading and Storytelling improve students English speaking ability?
2. What are students' attitudes toward teaching English speaking ability using Teaching Proficiency through Reading and Storytelling?

3. Research Objectives

The objectives of this research were:



2.1. To study and compare the English speaking ability of Prathomsuksa 5 students before and after studying English speaking ability using Teaching Proficiency through Reading and Storytelling.

2.2. To investigate students' attitude towards teaching English speaking ability using Teaching Proficiency through Reading and Storytelling.

4. Literature Review

4.1 Communicative Language Teaching (CLT)

4.1.1 Definition of Communicative Language Teaching.

CLT is a way to teach language that uses real-world materials, interactional techniques, and real-world situations and problems to help students do task-based activities (Brown, 2007). Learners are required to take away assignments that focus on the context and daily usage of language in communicative language education learning and achieve specific goals through language practice in their everyday lives (Hedge, 2014). A key component of communicative language instruction that sets it apart from conventional methods is the involvement of students in communicative tasks that are meaning-focused. A language's function, usage, and proper usage must all be understood by language learners (Harmer, 2015). In conclusion, communicative language teaching refers to a style of instruction that places more emphasis on students learning how to use language in authentic and engaging contexts than on the grammatical rules themselves. The acquired language ought to be useful and applicable in daily life.

4.1.2 Activities in CLT

The communicative activities of speaking lists (Dixon, 2016) are as follows:

4.1.2.1 Picture Prompt: Invite students to look at a picture and then respond to a partner about what they see.

4.1.2.2 This Makes Me Think That: Students work in groups or pairs for this activity. The activity begins by showing them an article or video.

4.1.2.3 Circle Speaking: Students should form two circles with partners facing each other, and students on the inside or outside start to talk, while the partner across the circle listens.

4.1.2.4 Interaction Lines: Have students pretend to be the teacher and quiz each other. Each student should think of a question to which he or she knows the answer.

4.1.2.5 Agree/Disagree Value Lines: ask students a series of questions with that they can agree or disagree.

4.1.2.6 Story chain: form groups of four students. A student in each group is asked to begin a story. After a period of time, e. g., 1 minute, the next person in the group must continue the story.

4.1.2.7 Folktale Storytelling: Invite students to read a folktale and then recite it to the rest of the group from memory.

4.1.2.8 Discussion Questions: While asking questions is a hallmark of every good teacher, it is a very commonly ignored aspect of teacher training.

4.1.2.9 Fishbowl-this: This activity requires four learners to only speak while all the others listen. This is done by placing four chairs facing each other in the center of the room.



4.1.2.10 Three Objects in a Backpack: Place three items in a backpack and explain to students that each of these three things has personal meaning, such as a trophy, a picture, and a ticket stub. Ask students to bring three objects to class and share what the objects mean to them.

4.2 Speaking

4.2.1 Definition of Speaking

Speaking is frequently considered as a casual, impromptu method of expression, and it might be dismissed as simple, superficial, or glib. Speaking is the most commonly judged skill, and it may create or break friendships (Bygate, 2010). speaking is a productive skill that can be witnessed directly and empirically. It is the result of the speaker's creative construction, in which vocabulary, structure, and discourse are all chosen by the speaker. Moreover, speaking is a productive skill that can be witnessed directly and empirically. It is the result of the speaker's creative construction, in which vocabulary, structure, and discourse are all chosen by the speaker (Brown & Abeywickrama, 2010). Furthermore, speaking is the ability to communicate in a variety of situations and for a variety of purposes, requiring not only linguistic competence but also the ability to process the information on the spot (Harmer, 2015). In conclusion, speaking is an interactive activity that is utilized to communicate with others, as defined by the concepts above. It refers to the ability to create and produce meaningful expressions as well as the process of doing so. It occurs in a variety of contexts and is an important aspect of people's daily lives.

4.2.2 Teaching Speaking Skills Procedures

The following are the teaching speaking Cycle model (Burns, 2012):
Stage 1: Focus learners' attention on speaking

The teacher encourages students to produce plans for their overall speaking development in order to prepare them for a specific speaking task.

Stage 2: Provide input and/or guide planning

The teacher uses scaffolding in preparation to meet the demands of the speaking task.

Stage 3: Conduct speaking tasks

The teacher provides learners with a setting in which they can practice speaking through a communicative assignment.

Stage 4: Focus on language, skills, and strategies

The teacher provides students with an opportunity to improve their linguistic accuracy as well as their ability to effectively apply skills and techniques.

Stage 5: Repeat speaking tasks

The learners repeat the speaking task(s) from Stage 3, except that they have had the opportunity to analyze and practice specific language elements or abilities during Stage 4. Encourage students to reflect on their learning.

Stage 6: Encourage students to self-regulate their learning by having them monitor and evaluate prior phases' content. The teacher facilitates feedback on learning.

4.3 Teaching Proficiency through Reading and Storytelling



Teaching Proficiency through Reading and Storytelling is a way of teaching English that aims to increase and develop fluency in utilizing the target language while telling some engaging stories in the classroom. As a result, Teaching Proficiency through Reading and Storytelling is a language teaching method that focuses on developing true fluency. Students and teachers spend class time talking about fascinating, understandable stories in the target language. Thus, this part will be focused on Teaching Proficiency through Reading and Storytelling, as established and developed by Ray & Seely (2015). The aspects to be presented are as follows:

4.3.1 The History

Teaching Proficiency through Reading and Storytelling was discovered by Ray, B. who invented and developed TPR storytelling during the 1990s. He had initial success teaching using total physical response (TPR), but then found the method less effective for students. Thus, he continued to improve the method with Stephen Krashen's theories, and he was confident that his students would acquire the language naturally whenever he gave them enough comprehensible input. He discovered a way to combine TPR with stories, with input from Krashen and other foreign language teachers, and the result was Total Physical Response Storytelling. According to Ray (2004: vii), Teaching Proficiency through Reading and Storytelling acronym was changed to stand for Teaching Proficiency through Reading and Storytelling in 2000 because Teaching Proficiency through Reading and Storytelling placed a greater emphasis on reading and the spoken class story.

4.3.2 The principles

The basis of Teaching Proficiency through Reading and Storytelling was formed by TPR, mastery learning (the belief that each student should obtain as much time and instruction as they need to understand what is being discussed), and Stephen Krashen's explanation of the essential role of input in acquisition. The technique features a well-developed set of principles in addition to step-by-step instructions for teaching using TPRS. These principles enable teachers to assess their use of class time in terms of whether it creates the right conditions for language learning. The key principles that underpin Teaching Proficiency through Reading and Storytelling are as follows.

4.3.2.1 Students need huge amounts of input to acquire language, TPRS' main purpose is to spend as much class time as possible giving intelligible input to pupils through teacher speech and reading.

4.3.2.2 Language should always be comprehensible.

4.3.2.3 Students should learn a small number of high-frequency words and phrases to mastery.

4.3.2.4 Words should be introduced in a form in which they are commonly used.

4.3.2.5 Input must be structured to ensure high frequency for key items and also be varied and compelling.

4.3.2.6 Students work on comprehension before working on production.

4.3.2.7 Only minimal class time should be used for learner output.



4.3.3 The Three Steps of Teaching Proficiency through Reading and Storytelling

According to Ray & Seely (2015: 35), it is a combination of practices that enables the instructor to achieve the goal of assisting students in achieving fluency in the classroom. The following are the three basic steps:

Step 1: Establish meaning

1.1 The teacher translates the meaning of the topic to the students by using gestures, pictures.

1.2 The teacher props along translation to assists students process the language faster, and students' understanding clearly

Step 2: Ask a story

2.1 In the first location. The teacher introduces a problem with is something that can be resolved like a boy needing or wanting something.

2.2 In the second location. The teacher makes an unsuccessful attempt to solve the problem. They either change the problem or add information about why the problem can't be solved in that location.

2.3 In the third location. Each location allows the teacher to look at the same problem from a different perspective. This makes the lessons even more repetitive and helps students remember the details of the story.

Step 3: Reading

3.1 To ensure complete understanding, the teacher chooses a student to read the paragraph in English and the student writes down the meaning of any words they don't understand.

3.2 The teacher asks the facts of the paragraph this simply ask the facts of the paragraph sentence by sentence.

4.4 Attitude in Language Learning

4.4.1 Definition of Attitude

Attitude is cognitive and effective, which is related to thoughts as well as feelings and emotions. Attitudes are developed early and influenced by many things, such as parents, peers, friends, and interactions with people who have social and cultural differences. Attitudes are classified into two types, namely, positive, and negative attitudes (Brown,2000). In addition, Attitude is a positive, negative, or mixed response to a person, object, or idea (Brehm, Kassin & Fein, 2002). Furthermore, attitude is a generally enduring structure of beliefs, emotions, and behavioral proclivities when it comes to socially relevant things, organizations, events, or symbols (Hogg & Vaughan, 2005). To conclude, in language learning, attitude is significant since it can enhance or impede the learner's progress. Attitudes are formed early in life and are influenced by a variety of factors. Thus, the willingness of learners to take responsibility for their own learning is influenced by their views toward language learning. They are highly essential aspects that influence their encouragement of learning activities.

4.4.2 Attitude Measurement

Contributors may respond to questions or report on observations made by observers about topics of interest if they do so in a way that reveals either 1 or 3 (strong agreement or favor, impartial opinion, or learners'



attitude toward the topic). Defendants choose a score between 1 and 5 for each statement to represent agreement or disagreement, importance, with 5 signifying serious disagreement or disgrace (Likert (1932)

4.5 Research Studies

Teaching Proficiency through Reading and Storytelling to Promote Vocabulary Learning Achievement of Fourth-Grade Students who studying in Ban Nongrung School, Khonburi District, Nakhon Ratchasima Province. And This study indicated that using Teaching Proficiency through Reading and Storytelling could effectively improve fourth-grade students' vocabulary learning achievement. (Ponguagoon, 2021)

It was discovered that the implementation of Teaching Proficiency through Reading and Storytelling was done in two cycles among kindergarten students at JAC School Surabaya. The students were enthusiastic actors who actively responded to the teacher's question. It improved the students' ability to retell stories. (Octaviani, 2018).

An investigation into the effect of Teaching Proficiency through Reading and Storytelling on third grade vocabulary acquisition discovered that teaching proficiency through reading and storytelling is effective in improving the vocabulary acquisition of the experimental group students (Bulan & Kasapoglu, 2021).

Teaching Proficiency through Reading and Storytelling Instruction was an acceptable way to scaffold language by making it understandable and accessible. The questionnaire's results also showed that students' behavioral attitudes toward using the Teaching Proficiency through Reading and Storytelling approach to teach speaking skills were overwhelmingly favorable, and students are more appreciative, involved, and self-assured. (Nugraha, 2021).

In conclusion, teaching competency through reading and storytelling is a beneficial strategy that can be applied to a variety of languages to assist students learn more effectively and improve their English-speaking abilities.

5. Research Methodology

5.1 Samples

The samples in this study were 25 students of Prathomsuksa 5 students studying English in the first semester of the academic year 2022 at Bankokkhorkokpho School in Nong Bua Lamphu, selected by cluster random sampling.

5.2 Research Instruments

The research instruments included 12 lesson plans, an English speaking test of 10 questions (oral interviews), and an attitude questionnaire of 20 items.

5.3 Data Collection

Data Collection processes in this study were as follows:

5.3.1 Prior to the study, students take an English speaking ability pretest to determine their level of proficiency in the language (The oral interview included 10 questions based on the story chosen for lesson plans). Before the study's



duration, 10 oral interview items were scored using Hughes criteria by three raters, including the researcher (2003: 131–133).

5.3.2 The researcher carried out the teaching of English speaking ability using Teaching Proficiency through Reading and Storytelling according to the twelve lesson plans. The duration was 12 weeks, 2 hours a week, or 24 hours in total.

5.3.3 The researcher conducted the posttest using the English speaking ability test after the teaching process was completed, this is the same as the pretest.

5.3.4 The researcher distributed the students' attitude questionnaire to identify the students' opinions after learning English speaking ability using Teaching Proficiency through Reading and Storytelling.

5.3.5 The researcher analyzed the data from the pretest, posttest, and attitude questionnaire toward teaching English speaking ability using Teaching Proficiency through Reading and Storytelling.

5.4 Data Analysis

For analyzing the effectiveness of the English speaking ability test, Percentage was used. The Mean (\bar{x}) and Standard Deviation (S.D.) were used for analyzing the pretest and the posttest scores and the sample's attitude. The English speaking ability test was an oral interview test with 10 items developed by the researcher based on Hughes (2003: 131-132) to examine five aspects of language: pronunciation, grammar, vocabulary, fluency and expression. The value of the Index of Item Objective Congruence (IOC) was 1.00 for every item. The reliability of three raters was at 0.99. An attitude questionnaire toward teaching English speaking using Teaching Proficiency through Reading and Storytelling. The questionnaire was both in Thai and English and consisted of 20 items related to the contents using a five-point Likert's rating scale. The value of the Index of Item Objective Congruence (IOC) was 1.00 for every item.

In addition, one sample t-test was used or analyzing the students' posttest scores with the criteria of 70%. and t-test for dependent samples was used for comparing between students' pretest and posttest scores.

6. Research Results

The results were presented according to the research objectives as follows:

6.1 Results of the Study of the Prathomsuksa 5 Students' English Speaking Ability Before and After Studying English Speaking Ability Using Teaching Proficiency through Reading and Storytelling were shown in Table 1 below:

Table 1

The overall result before and after using Teaching Proficiency through Reading and Storytelling.



Students' Number	Pretest (300 scores)		Posttest (300 scores)	
	Average Scores	Percentage	Average Score	Percentage
1	79.00	26.33	182.67	60.89
2	86.33	28.78	202.33	67.44
3	101.67	33.89	216.33	72.11
4	96.33	32.11	187.67	62.56
5	107.33	35.78	211.33	70.44
6	88.00	29.33	224.67	74.89
7	99.00	33.00	216.67	72.22
8	98.67	32.89	211.33	70.44
9	140.33	46.78	234.33	78.11
10	113.33	37.78	212.67	70.89
11	94.33	31.44	222.00	74.00
12	117.67	39.22	231.00	77.00
13	97.33	32.44	225.67	75.22
14	100.00	33.33	196.00	65.33
15	128.00	42.67	231.00	77.00
16	99.00	33.00	237.67	79.22
17	113.67	37.89	237.33	79.11
18	97.67	32.56	230.67	76.89
19	150.67	50.22	259.33	86.44
20	108.67	36.22	246.00	82.00
21	109.00	36.33	246.67	82.22
22	124.67	41.56	237.00	79.00
23	97.00	32.33	232.67	77.56
24	100.67	33.56	230.33	76.78
25	131.33	43.78	264.33	88.11
\bar{x}	107.19	35.73	225.11	75.04
S.D.	17.08		19.99	

From Table 2, it shows that the students' pretest mean score on English speaking ability was 107.19 or 35.73 % and the posttest mean score was 225.11 or 75.04 %.

6.2 Results of the Comparison of Prathomsuksa 5 Students' English Speaking Ability before and after using Teaching Proficiency through Reading and Storytelling.

After the teaching program, Prathomsuksa 5 students took the posttest on English speaking ability. The findings of mean score on English speaking are displayed in Table 2.

Table 2

Result of the comparison of the students' English Speaking Ability Before and After Using Teaching Proficiency through Reading and Storytelling.



Test	N	\bar{x}	S.D.	T
Pretest	25	107.19	17.08	38.60**
Posttest	25	225.11	19.99	

** $P \leq .01$

From Table 2, it shows that the students' pretest mean score on English speaking ability was 107.19 and the posttest mean score was 225.11. The students' English ability after learning English using Teaching Proficiency through Reading and Storytelling was significantly higher than the prior one at the 0.01 level.

6.3 Results of the Comparison of Prathomsuksa 5 Students' English Speaking Ability After Learning English Speaking Ability Using Teaching Proficiency through Reading and Storytelling and the Set Criteria of 70 %.

After the teaching program, the sample took the pretest and the posttest on English speaking ability test after learning English Speaking using Teaching Proficiency through Reading and Storytelling of Prathomsuksa 5 students. The student's English-speaking ability was higher than the set criteria of 70 %. The findings are displayed in Table 3.

Table 3

Result of the Comparison of the Students' English speaking Ability After Using Teaching Proficiency through Reading and Storytelling and the Set Criteria of 70 %.

Test	The Set Criteria of 70 percent (210)				
	n	\bar{x}	S.D.	70 Percent	T
Posttest	25	225.11	19.99	107.19	3.77**

** $P \leq .01$

From Table 3, it shows that the student's posttest mean score on English speaking ability was 225.11. This result explains that the students' English-speaking ability after using Teaching Proficiency through Reading and Storytelling was significantly different at the .01 level. The posttest score was significantly higher than the set criteria of 70 %.

4.4 Results of the Investigation of the Students' Attitude Towards Learning English Speaking Ability using Teaching Proficiency through Reading and Storytelling



To study the students' attitude towards learning English speaking ability, the researcher used Teaching Proficiency through Reading and Storytelling attitude questionnaire. The attitude questionnaire consisted of 20 items utilizing a five-point Likert's rating scale, ranging from 5 (strongly agree), to 1 (strongly disagree). The questionnaire was administered after completing the teaching program. The findings are displayed in Table 4.

*Table 4
Result of an Investigation of the Students' Attitude Towards Teaching English Speaking Ability Using Teaching Proficiency through Reading and Storytelling.*

Attitude Test	n	\bar{x}	S.D.	Interpretation
Attitude Towards Learning English-speaking Using Teaching Proficiency through Reading and Storytelling.	25	4.25	0.07	Good

Table 4 shows that the mean score of the students' attitude towards learning English speaking ability using Teaching Proficiency through Reading and Storytelling was 4.22. This indicates that the students' attitude towards learning English speaking using Teaching Proficiency through Reading and Storytelling was at a good level.

7. Discussion

The research findings can be discussed in the following aspects:

7.1 According to the study and comparison of the English speaking ability of Prathomsuksa 5 students before and after using Teaching Proficiency through Reading and Storytelling, the results of the study illustrated that students' pretest and posttest scores on English speaking ability were 107.19, or 35.71%, and 225.11, or 75.04%, respectively. The results revealed that the posttest mean score was higher than the set criteria of 70 %, which was in accordance with the first hypothesis. The results revealed that the mean pre-test score of the students was at a low level due to their English background, which caused them to feel unconfident, uneasy, and tense and ultimately caused them to lose interest in speaking English.

Firstly, teaching English speaking ability using Teaching Proficiency through Reading and Storytelling could help students develop their English speaking ability very well. They practiced speaking English through the Teaching Proficiency through Reading and Storytelling process using stories. These findings supported the idea stated by (Burns, 2012) that, to improve fluency, students should develop fundamental speaking skills, such as the ability to quickly process speech and control the flow of speech as it develops. As part of communication strategies, the development of cognitive methods to compensate for language knowledge gaps is included. The ability to negotiate communication and interact with others is an additional essential skill. This supported idea by (Burns ,2012), (Harmer, 2015), and (Ray & Seely,2012).



Secondly, due to the fact that Teaching Proficiency through Reading and Storytelling is consistent with communicative language instruction, which allows students to create their own stories and encourages them to express conversation or phrases more freely, learning English speaking with this method could effectively improve students' speaking ability. The interesting learning activity made the kids feel at ease and motivated to study. There was no correct or improper answer. Adapted from real-world occurrences, the novel created accessible situations that students might employ in their daily lives. They were ecstatic to perform their structure-based intended narrative. As they attempted to tell the story, their grammar, accent, and fluency improved. This result was consistent with the study of (Muzammil & Andy, 2017), and (Octaviani, 2018).

7.2 The result of the students' attitude towards teaching English speaking ability using Teaching Proficiency through Reading and Storytelling, the results suggested that the students had a positive attitude towards learning English with Teaching Proficiency through Reading and Storytelling. As seen in Table 5, where the items had a mean score of 4.25, this demonstrates that the students' attitude toward learning English with Teaching Proficiency through Reading and Storytelling was at a good level. And this shows that the majority of students thought that using Teaching Proficiency through Reading and Storytelling to acquire English speaking ability was effective. The results from the respondents indicate that the students had fun and enjoyed learning English speaking. Teaching Proficiency through Reading and Storytelling of teaching English speaking aided students in comprehending the story and grasping the essential themes because they produced it with the teacher. The students also enjoyed the mixed-abilities group-work activities that fostered cooperative learning and improved their understanding of the story because they were able to share information and ideas with their classmates without experiencing anxiety, which boosted their confidence when they shared and told the story to the class. This result was consistent with the study of (Braunstein, 2006), (Numpaque, 2010: 3), and (Nugraha, 2021)

8. Conclusion

The study and comparison of pretest and posttest scores of English speaking ability and an investigation of Prathomsuksa 5 students' attitude towards learning English speaking using Teaching Proficiency through Reading and Storytelling were the mean of English speaking ability scores for the students were 107.19, or 35.73%, and 225.11, or 75.04%, respectively, on the pretest and posttest. The students' mean posttest score was higher than the set criteria of 70% and was greater than their mean pretest score and the students' attitude towards Teaching Proficiency through Reading and Storytelling to teach English speaking was at a good level. The mean score was 4.25.

9. Recommendations

9.1 Teaching Proficiency through Reading and Storytelling could be promoted and used among English teachers in order to help students have more confidence and less anxiety when speaking English, as working in pairs and small groups throughout the students' learning helped facilitate their English speaking. and



fostered the creativity of students by requiring them to create stories during and after learning and by encouraging them to pay attention to practicing and speaking English. It made them enjoy the challenge of telling and acting out the story, and many students had a positive attitude toward teaching English as a result.

9.2 The recommendation for further study is that researchers should explore and consider developing other methods of English language skills and should promote and apply Teaching Proficiency through Reading and Storytelling with other types of learning approaches in order to provide students more support in the different areas of their learning in high-quality environments where students feel comfortable asking questions and are confident speaking English.

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The Study of Mathematics Problem Solving Ability of Grade 5 Students in Primary Schools through Learning Management by using 5E Teaching Model

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Abstract

The purposes of this research were to: 1) compare mathematics problem solving ability of the students before and after learning through 5E Teaching Model. 2) To compare mathematics problem solving ability of the students with the determined criterion set at 70%. 3) compare Mathematics achievement of the students before and after learning through 5E Teaching Model. 4) compare Mathematics achievement of the students with the determined criterion set at 70% of full scores. The sample used in this study was 40 students in Grade 5 of Bayi Primary School in Zhoukou, Henan Province, China. They were selected by cluster random sampling. The research tools were as follow: 1) Five lesson plans of the 5E teaching model on the topics of triangle area, parallelogram area, trapezoidal area rectangle and square volume, rectangle and square surface area. 2) Mathematics achievement test with reliability of 0.704. Mathematical problem solving ability test with a reliability of 0.826. Statistical data used for data analysis were the mean value, standard deviation and T-test of samples.

The results are as follows:

- 1) Mathematics problem solving ability of fifth grade students after being exposed to the 5E teaching model was higher than before at a statistically significant level of 0.05.
- 2) Mathematics problem solving ability of fifth grade students after being exposed to 5E teaching model was higher than the 70% criterion at the 0.05 statistical significance level ($\bar{X}=7.425$, S.D. =0.931).
- 3) Mathematics achievement of fifth grade students after being exposed to 5E teaching model was higher than before at a statistically significant level of 0.05.
- 4) Mathematics achievement of fifth grade students after being exposed to 5E teaching model was higher than the 70% criterion at the 0.05 statistical significance level ($\bar{X}=23.875$, S.D. =3.975).

Keywords: 5E Teaching model, mathematical problem solving ability, Mathematics Achievement, Student-centered, Independent Exploration, Knowledge construction

1. Introduction

In 2016, China Education Innovation Research Institute and global Education Innovation Summit jointly released a report «Looking To the Future: Global



Experiences in Core Literacy Education for the 21st Century》 Put forward : “The cultivation goal of students is changed from the accumulation of knowledge to the ability to effectively use various resources, cooperate with heterogeneous others and solve problems. Specifically, it is to train from "knowledge" gradually to "energy" development extension” (Shang Yufei, 2020) . In 2022, the Ministry of Education of the People's Republic of China promulgated the “Mathematics Curriculum Standards for Compulsory Education” emphasized: The problem solving ability is regarded as the skills that students must master in the process of mathematics learning and also as the overall goal of curriculum development. It can be seen that training students' problem-solving ability has become an important task in current education and teaching, and at this time also highlights the importance of classroom teaching. It has become the goal of many educators to choose excellent teaching mode, let everyone get good mathematics education, and gradually acquire the ability to adapt to lifelong development.

Nowadays, with the development of big data analysis and artificial intelligence, the research and application fields of mathematics are also constantly expanding, and the growth environment of students is changing profoundly, their thinking and vision are constantly expanding, and the problems they face are emerging one after another, which requires a positive attitude and the ability to solve problems. In a word, mathematics

problem solving ability is not only to improve mathematics scores, but also the comprehensive embodiment of students' core accomplishment, which needs physical and mental cooperation and development. On the one hand, students need to have a certain mathematical literacy, to be able to see the subtle, divergent thinking in mathematical problems to solve subtly. On the other hand, students' interests and hobbies are the boosting agent for the development of this ability, which can well stimulate students' initiative to study problem solving methods. (Zhang Yuqing, 2020).

Primary school mathematics is the basic stage of learning mathematics, but also an important period to cultivate mathematical problem solving ability. At this time, classroom teaching is particularly important. But in the actual teaching process, there are still some unscientific phenomena, but also trying to find effective ways to solve the problem. The problems in teaching mainly include the following aspects:

1. Improper situation creation.

Mathematics teaching situation can arouse students' thinking. The curriculum standards also emphasize that students should focus on teaching tasks, choose close to their actual life, knowledge experience, age characteristics and cognition as materials for processing, follow the scientific, reasonable and interesting principles to design problem situations, stimulate students' motivation, expand students' thinking, help students better understand the knowledge, promote the improvement of problem solving ability. At present, the benefit of creating the artistic conception of questions has been attached importance by the majority of educators. But there are also problems in the creation of simple and boring form, lack of appeal; Or excessive pursuit of situation



creation and other issues, which makes students unable to form the required spatial thinking (Zhao Xiaoxiao, 2021).

2. Ignore the students' dominant position

Students are the main body of learning, and teachers are the organizers and guides of learning. Curriculum standards emphasize that students' principal position should be highlighted in teaching activities, and students should actively participate in the classroom. Through independent exploration links such as observation, practice and analysis, students can understand and master basic knowledge and skills, experience and apply mathematical thinking and methods, and acquire mathematical problem-solving experience and ability. Teachers in the classroom is to give certain guidance and help. At present, there are still many teachers in the use of a single "indoctrination" teaching method, do not pay attention to the cognitive characteristics of pupils, resulting in students' classroom performance is not active, the quality of classroom learning is not high phenomenon, affecting students' in-depth learning (Cen Rongying, 2018).

3. Teaching guidance unclear.

When designing teaching, teachers should analyze the essence of teaching content and students' cognitive law, reasonably integrate teaching content, analyze the main performance of knowledge and ability cultivation in each chapter, determine teaching objectives, and implement them into teaching activities in an orderly and step by step way to promote students' understanding and mastery of what they have learned. however, there are still some cases in which teachers' teaching instructions are unclear and fail to reflect the teaching objectives of the chapters taught, resulting in students unknown how to raise valuable questions and unable to analyze the relationship between mathematical information in the situation, which affects their understanding and application of knowledge. (Zhao Xiaoxiao, 2021).

To solve these problems, we must Choose the appropriate teaching mode, which promotes both teachers and students. 5E teaching model insists on student-centered, from introduction to refinement, is the process of discovering and solving problems, creating opportunities for students to explore knowledge and promoting the development of mathematical thinking. Specifically, the 5E teaching model is suitable for the requirements and standards of "compulsory education mathematics curriculum standards". In this paper, based on the 5E teaching model, through the implementation of five teaching steps, to mobilize the enthusiasm and initiative of students to learn mathematics, deepen the understanding and application of knowledge, so as to improve mathematics performance and mathematical problem solving ability.

2. Research objectives

This research consisted of three objectives:

2.1 To compare mathematics problem solving ability of the students before and after being exposed to 5E Teaching Model.

2.2 To compare mathematics problem solving ability of the students with the determined criteria with a set criterion of 70 % .



2.3 To compare Mathematics achievement of the students before and after being exposed to 5E Teaching Model.

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3. Research hypothesis

3.1 Mathematics problem solving ability of Grade 5 students after being exposed to 5E Teaching Model is higher than before.

3.2 Mathematics problem solving ability of Grade 5 students after being exposed to 5E Teaching Model is up to 70%.

3.3 Mathematics achievement of Grade 5 students after being exposed to 5E Teaching Model is higher than before.

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4. Research Methodology

4.1 Samples

The population in this study was 120 Grade 5 students (3 classrooms) of primary schools in Bayi Road, Zhoukou City, Henan Province, China.

The sample for this study was 40 Grade 5 students (1 classrooms) of primary schools in Bayi Road, Chuanhui District, Zhoukou City, Henan Province, selected through cluster random sampling method.

4.2 Research instruments

4.2.1 Instruments for measuring mathematical problem solving ability and mathematics achievement. Instructional innovation for 5 E Teaching Model comprised of five steps.

Step1 Engagement: (Teaching behavior) 1. Be familiar with the course content, students' original knowledge, experience and psychological characteristics. 2. Create interesting, effective and life-related problem situations through videos, games, experiments, etc. (Student behavior) 1. Think about the problem. 2. clear learning objectives and tasks.

Step2 Exploration: (Teaching behavior) 1. Provide relevant learning materials and give students sufficient time to conduct targeted research. 2. students encounter confusion, give indirect guidance. (Student behavior) 1. Explore individually or in groups. 2. Think about the problem, record the results, and form opinions.

Step3 Explanation: (Teaching behavior) 1. Encourage students to use their own language to explain their understanding of new concepts or skills in the process of inquiry. 2. Describe new concepts or skills in accurate, scientific and concise language. (Student behavior) 1. Actively interpret the findings 2. Listen to your classmates' answers and ask questions. 3. Understand what the teacher says and answer questions with new knowledge.

Step4 Elaboration: (Teaching behavior) 1. Ask students to use standard language to tell the new knowledge. 2. Create new problem situations and

2.3 To compare Mathematics achievement of the students before and after being exposed to 5E Teaching Model.



2.4 To compare Mathematics achievement of the students with the determined criterion with a set criterion of 70% .

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Step4 Elaboration: (Teaching behavior) 1 . Ask students to use standard language to tell the new knowledge. 2. Create new problem situations and exercises to help students consolidate and strengthen the new knowledge, understand the transfer and application. (Student behavior) 1. Understand the connection between old and new



knowledge, and complete cognitive construction. 2. Able to solve problems with newly learned knowledge.

Step5 Evaluation: (Teaching behavior) 1. At the end or in each process, give appropriate evaluation on the overall performance of students in class. 2. Evaluate students' interpretation of inquiry results and mastery of skills. (Student behavior) According to the knowledge understanding and grasp of the situation to summarize, reflect, evaluate the advantages and disadvantages.

4.2.2 Lessons plan: A total of five lessons plans and 10 hours of primary math instruction were assigned. Lesson plans presented in this study were quality assessed by five experts (Professor and associate professor) on the appropriateness of their components. The average appropriateness score of the evaluation team was 4.8 points out of 5, which was very high and suitable.

4.2.3 Instruments for collecting data

In this study, two test papers were used as measuring tools to collect data, which was used to detect students' mathematical achievement and mathematical problem solving ability development.

4.2.3.1 Instrument for measuring : mathematical problem solving ability

1) The test consists of two subjective questions(5 scores of 1 item, designed to examine students' ability to analyze and solve mathematical problems. The Index of Item Objective Congruence (IOC) of each item in the evaluation form was 1 higher than 0.8, the result of analyzing the IOC index showed that all test items were appropriate and could be used in the test difficulty (p) between 0.2 - 0.8 and discriminability (r) > 0.2, mathematical problem solving ability test with a reliability of 0.826.

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2) Homework

3) Teacher's ask questions

4.2.3.2 Instrument for measuring: mathematical achievement



1) The test consists of 30 multiple choice questions (1 score of 1 item). This mainly examines students' memory, understanding and application of the knowledge they have learned. The Index of Item Objective Congruence (IOC) of each item in the evaluation form is 1 higher than 0.8, the result of analyzing the IOC index showed that all test items were appropriate and could be used in the test difficulty (p) between 0.2-0.8 and discriminability (r) > 0.2 , achievements test with a reliability of 0.704.

2) Homework

3) Teacher's ask questions

4.3 Data collection

The procedures of data collection were as follows:

1. The samples was given the pretest for measuring Mathematics Achievement and Mathematical problem solving ability with constructed instrument.

2. The samples was taught by using 5E Teaching Model.

3. After finishing the instruction, the samples received the posttest by using the same instrument which was used in the pretest.

4.4 Data analysis

In this study, statistical procedures were used to analyze the data combined with the research objectives.

Compare Mathematics Achievement and Mathematical problem solving ability before and after were exposed to 5E Teaching Model by using t-test for dependent sample.

5. Research Results

The results were presented according to the research objectives as follows:

5.1 Section 1 Result of comparing mathematics problem solving ability of the students before and after being exposed to 5E teaching model by using t-test for dependent sample are shown below.

Table 1

Paired samples test

Group	N	Pretest scores		Posttest scores		t	p
		\bar{X}	S.D.	\bar{X}	S.D.		
Experimental group	40	4.500	1.155	7.425	0.931	22.327*	.000

$p < 0.05$

Based on the results, we can state the following:

As shown in Table 1, Students had mathematics problem solving ability after being exposed to 5E Teaching Model (post-test) greater than before learning (pre-test) at .05 statistically significant level ($t = 22.327^*$, $p < 0.05$).

On average, Posttest scores were 2.925 points higher than Pretest scores (95%).

Thus, it was concluded that, mathematics problem solving ability of Grade 5 students after being exposed to 5E Teaching Model was higher than before.



5.2 Section 2 Result of comparing mathematics problem solving ability of students with the determined criteria set at 70 % by using t-test for one sample.

Table 2

Group	N	Full score	Criteria score	\bar{X}	S.D.	t	p
Experimental group	40	10	7	7.425	0.931	50.462*	.000

$p < 0.05$

Based on the results, we can state the following:

According to *Table 2*, The average score for the mathematics problem solving ability of Grade 5 Students after being exposed to 5E Teaching Model was 7.425 from a full marks of 10 and the standard deviation was 0.931, which was statistically higher than the criterion of 70% at .05 level of statistical significance ($t = 50.462^*$, $p < 0.05$).

Thus, it was concluded that, mathematics problem solving ability of students who were exposed to 5E teaching model was higher than 70%.

5.3 Section 3 Result of comparing mathematics achievement of the students before and after being exposed to 5E teaching mode by using t-test for dependent sample are shown below.

Table 3

Paired samples test

Group	N	Pretest scores		Posttest scores		t	p
		\bar{X}	S.D.	\bar{X}	S.D.		
Experimental group	40	19.575	3.706	23.875	3.975	12.373*	.000

$p < 0.05$

Based on the results, we can state the following:

According to *Table 3*, Students had mathematics achievement after being exposed to 5E Teaching Model (post-test) greater than before learning (pre-test) at .05 statistically significant level ($t = 12.373^*$, $p < 0.05$).

On average, Posttest scores were 4.3 points higher than Pretest scores (95%).

Thus, it was concluded that, mathematics achievement of Grade 5 students after being exposed to 5E Teaching Model was higher than before.

5.4 Section 4 Result of comparing mathematics achievement of students with the determined criteria set at 70 % by using t-test for one sample.



Table 4

Group	N	Full score	Criteria score	\bar{X}	S.D.	t	p
Experimental group	40	30	21	23.875	3.975	37.982*	000

$p < 0.05$

Based on the results, we can state the following:

According to Table 4, The average score for the mathematics Achievement of Grade 5 Students after being exposed to 5E Teaching Model was 23.875 from a full marks of 30 and the standard deviation was 3.975, which was statistically higher than the criterion of 70% at .05 level of statistical significance ($t = 37.982^*$, $p < 0.05$)

Thus, it was concluded that, mathematics achievement of students who were exposed to 5E teaching model was higher than 70%.

6. Discussion

The following points based on the research results were discussed:

6.1 5E teaching model has changed the teaching process, teachers' teaching philosophy and students' learning methods. In this study, teachers actively accept the teaching concept of 5E teaching model, respect the cognitive characteristics of students, and believe that each student will have different progress and development. At the same time, based on the 5E teaching model, students are centered and the ability of inquiry, problem solving, cooperation and communication is cultivated through teaching activities. Therefore, mathematics education not only teaches students knowledge and skills, but also develops students' necessary character and development ability. (Xiang Xiannian 2020, Deng Haimei 2021).

6.2 Creating reasonable artistic conception of questions is conducive to the smooth development of teaching activities. Teachers set interesting questions related to students' life reality, familiar stories, cognitive characteristics and so on to introduce the new lesson, which can trigger students' knowledge conflict, stimulate students' curiosity, so that they can concentrate their attention, actively participate in the class, and complete the corresponding learning tasks according to the teaching plan. It should be noted that teachers should give encouragement and guidance during the period to help students build up confidence to overcome difficulties. (Sun Jiadong 2022, Deng Haimei 2021).

6.3 5E teaching mode is helpful to teachers' teaching.

The teaching requirements of each teaching link of 5E teaching mode are different, and the teaching strategies adopted are also different, which points out the direction of teachers' teaching. Teachers understand the theory of the teaching model, combine the actual teaching situation and other aspects of the content, and make a reasonable and scientific planning of the whole teaching. In the process of implementation, the classroom becomes more interesting and more passionate about learning. Under the explicit guidance of teachers, students can understand



what they have learned and complete the dual transfer of knowledge and methods. Teachers' teaching effect and students' learning effect have been improved. (Xiang Xiannian, 2020; Burcu Sezginsoy Seker, Aliye Erdem, 2017).

7. Conclusion

In the process of experiment, through the actual situation of classroom teaching, testing, data analysis and other links, to understand the students' grasp of knowledge, summed up the following conclusions:

Compared with traditional teaching, 5E teaching mode has certain teaching effect. From the data and the classroom learning, the students in the experimental class no longer understand the superficial appearance of knowledge, but actively and seriously explore the context of knowledge, and actively use scientific thinking analysis, trying to use different methods to solve problems. From the analysis of the data results, it can be seen that the mathematical performance and mathematical problem solving ability of the students in the experimental class have been significantly improved, reaching the established standard of 70%, and the experimental results have reached the research objectives.

In a word, 5E teaching mode has certain operability in primary school mathematics education. To a certain extent, it stimulates students' interest in learning, gives full play to students' initiative and enthusiasm, and improves students' learning ability and quality. The teaching concept of "student-oriented, teacher-oriented" has been further implemented to improve teachers' teaching.

8. Recommendations

The following are some recommendations based on the research results:

8.1 Suggestions for applying the research results

1) In teaching practice, 5E teaching mode promotes students' understanding and learning of knowledge, and improves students' performance and problem-solving ability. Therefore, teachers can consider using 5E teaching mode according to the teaching content.

2) Teachers need to strengthen the theoretical study of 5E teaching mode, have a solid knowledge reserve, and master the key points and skills of each link flexibly. Only in this way can they effectively complete the teaching content and tasks, improve the teaching ability and quality, and build confidence in teaching.

3) 5E teaching model has more teaching steps, and students have less contact with some teaching links. Therefore, in teaching practice, teachers should give guidance and encouragement to help students build confidence, bravely express themselves, and enhance their interest in learning.

4) 5E Teaching mode in teaching practice, teachers should pay attention to the classroom performance and learning state of students, do a good job in classroom order



and time management, ensure students' learning subjectivity and enthusiasm to participate in class, so as to achieve better teaching effect.

8.2 Suggestions for the next research

1) This study only selected a primary school for teaching practice. In the future, expand the scope and practice in more schools, and the experimental results will be more empirical.

2) The 5E teaching model has high requirements on teachers. Due to the limited teaching experience and the influence of external factors and resources, the research on the 5E teaching model needs further exploration in the future.

3) Constantly reflect on and improve the shortcomings of this study in teaching practice in the future, and gradually improve it in long-term application, so as to provide guidance and reference for teachers to carry out teaching practice more effectively.

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Organization of Agricultural Learning Activities of Schools under the Chiang Mai Primary Educational Service Area Office

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Abstract

This study has the following objectives: 1) A study the general characteristics of the executive committee for agricultural learning activities in school administrators, teachers in charge of agricultural learning activities and community representatives who are school committee 2) study the attitudes of activity management committees towards agricultural learning activities in school 3) study the development of agricultural learning activities in is an exploratory research. The sample was collected from 180 schools from 6 districts of Chiang Mai Primary Educational Service Area by interviewing people from 3 parties, namely school administrator, teachers in charge of agricultural learning activities, and community representatives who are school committees, 180 each, totaling 540 people. Data was analyzed using descriptive statistics, and find differences in opinions between groups using ANOVA. This study found that most of the 3 groups were males, aged in working age, most of their education are master's degrees. The teachers had the most average experience. The 3 groups had the mean attitudes significantly different at the 0.05 level of significance.

Keywords: Attitude, Learning Agriculture, Organization of Agricultural

1. Introduction

Agricultural learning activity is an activity to learn about farming, husbandry, and fishing. This kind of activity is a part of Career and Technology Subject which considered by Ministry of Education as a course syllabus of basic agriculture subject (Institute of Academic Development (IAD), 2017). This activity has been conducting since 1932 and then assigned as a course syllabus. Then it has been adjusted according to economic, social, political occasions until 1990, it was defined as primary and secondary course syllabus. The main purposes of this subject are 1) to educate the learners about the basics of daily working and basic occupation, 2) to provide the learners tools using and working process knowledge in order to work with the others functionally as well as to help the family members and the others depend on their ages, 3) to instill the learners good working manners and how to be self-reliance, and 4) to let the learners provide their creativity, revision, and good working processes regularly. From a long term conduction found that almost school agricultural learning activities do not meet the key purposes as expected. After studied from many researchers found that this kind of activity could not be improved as forecasted due to these problems: 1)



school and students' parents do not support agricultural learning activity as the course needed since the parents do not impress if their children do the agricultural jobs and they might not allow their children do this kind of occupation. In addition, schools do not give their priorities on this activity and some institutes shall not assign this subject for the complete learning periods, 2) schools are short of proper activity support factors like insufficient activity budget, lacking of practical sites, and do not have significant working tools, 3) in-charge teachers are short of proper agricultural learning activity providing knowledge. many primary and secondary schools are deficient of expert agricultural teachers due to insufficient assignment or agricultural major graduates. From this matter, schools have to allow the other major graduates to apply for this position, 4) being short of new agricultural learning activity developments (Chana, 1996; Sanchana, 2018, and Chongrak, 2011).

As in research recognized from the above paragraph, these problems are about insufficient agricultural major teachers and school farming practical areas as well as non-agricultural major teachers and students' parents do not prioritize to this activity. From the previously mentioned, providing this activity strongly does affect to schools. Thus, it should not be ignored and careless until it is gone or further discontinued. One of Ministry of Education key principles found that to provide agricultural learning activity, local communities should be a part (Office of the Basic Education Commission: OBEC, 2008). From the previous mentioned matter, it does support the schools to achieve their development for education management, service, and activity providing, therefore, it shall be one of the solution paths. As can see from many studies, to allow communities be a part of this activity, schools shall be able to have these advantages 1) to be able to educate the same activity providing direction for community and school which focuses on students' actual learning and practice including various knowledge from the experts (Apidet, 2017 and Carol, 2015), 2) the parents are able to participate this activity to inspire their children for joining this learning activity for both home and school activities (Sango, 2016), 3) students shall have more proper knowledge after this activity and they might give them better cooperation, have more impression, as well as be able to give many more advantages for schools and communities within the other academic service areas (Chariya, 2017; Nirand, 2018, and Peter, 2010), 4) agricultural learning activity committees shall share their own experiences and properly conduct their possibilities (Chuchat, 2017; Brenda, 2015 and Peter, 2010), and 5) the parents shall support this activity budget through fundraising for schools and also school' activities in order to provide new knowledge and directions which influence students to have further practical skill development (Andrew, 2011 ; Mattew, 2014 and Peter, 2010). Those mentioned researches gave us the important question "Would community joining affect the agricultural learning activity development?"

This current study aims to explore Chiang Mai Province areas due to its widest area in the northern region of Thailand and second widest province of Thailand. Most population work as farmers and reside around the farming areas as well as live in the agricultural society (Chiang Mai Provincial Education Office, 2020). After the researcher explored the related studies within Chiang Mai Province, they found that most studies focused on some school occasions as in research could see



from Chutima (2009) which studied ecological framework to support community participation with main schools within Maehaenua Village, Athipong (2012) studied about community learning management participation for Banmaenganluang School, Mae Chaem District, Chiang Mai Province, Saifon (2015) studied about participation action research in order to develop learning media through local wisdom integration which conforms to community way of livings. This research explored 2 schools; Banrongkheelek School and Banloungnuea School. Kiangkrai (2017) studied about community participation in Excellent District School Project with Banmaewae School, Chiang Mai Primary Educational Service Area Office 2, and found that it was short of exploratory researches throughout schools in Chiang Mai Province. Therefore, the researcher is interested to agricultural learning activity within Chiang Mai province in order to explore whether schools within Chiang Mai Province allow community to develop the activity, how do they join the activity, and which affect that they give after participated the activity. This study shall provide beneficial agricultural learning activity providing directions with community. Students are able to pass on their knowledge to family members and community thus they and their parents shall have good attitudes for farmers, moreover, community shall have activity development direction with schools and related sectors shall have community and school agricultural learning activity.

2. Research Objectives

This research consisted of three objectives:

- 2.1 To study the general characteristics of the executive committee for agricultural learning activities in schools.
- 2.2 To study the attitudes of activity management committees towards agricultural learning activities in schools
- 2.3 To study the development of agricultural learning activities in schools

3. Research Methodology

3.1 Samples

Population: Put the number of school administrators, teacher, and community representatives.

Sampling: random sampling using multi-stage sampling which consisted of the following steps: Step 1 Random districts with high, medium and low number of schools, respectively, from each educational area. Then randomly sampling each school to 60%. Step 2 From the schools randomly selected in step 1, the researchers grouped schools by large, medium and small. The large size school includes 401-1500 jis, your sampling medium size has 121-600 students and small size has 1-120 students (Chiang Mai Provincial Office of Education. Ministry of Education, 2020.) then randomly selected 60% of each group. Step 3: looks confusing researcher used the number of schools in Step 2 as a sampling frame of 421 schools, then determined the sample size by using the Taro Yamane (1973) sample size calculation method. total of 180 schools. Step 4: Randomize the schools in each district. By using a simple random distribution (Simple Random Sampling) to get the number according to the sample size in each district, calculated in step 3. In this research, the researcher collected data from 3 groups



of people: 1) 180 school administrators 2) 180 teachers responsible for agricultural learning activities 3) 180 community representatives who are school committees The total is 540 cases

3.2 Research Instruments

The tools used for data collection were interview forms with closed-ended questions and open-ended questions. The researcher interviewed individual.

3.3 Data Collection

Data were collected by individual interviews. Interviewer is the management committee for agricultural learning activities consisting of school administrators, teachers and community representatives of schools under the Chiang Mai Primary Educational Service Area Office 6 areas

3.4 Data Analysis

The researchers analyzed quantitative data using the following statistics:

3.4.1 Descriptive Statistics such as Frequency, Percentage, Mean, Maximum, Minimum and Standard Deviation explain the general information of school administrators. Teachers in charge of agricultural learning activities and community representatives who are school committees and attitude towards agricultural learning activities

3.4.2 Inferential statistics were used to analyze differences in attitudes of school administrators. Teachers in charge of agricultural learning activities and community representatives who are school committees of variance (ANOVA) was used.

4. Research Results

The results were presented according to the research objectives as follows:

4.1 Basic condition of school administrators Teachers in charge of agricultural learning activities and community representatives who are school committees It is shown in Table 1 as follows:



Table 1
Basic condition of school administrators Teachers in charge of agricultural learning activities and community representatives who are school committees

Basic Status		Director	Teacher	Community Representative
		Quantity (%)	Quantity (%)	Quantity (%)
1. Sex	Male	167 (92.8%)	131 (72.8%)	150 (83.3%)
	Female	13 (7.2%)	49 (27.2%)	30 (16.7%)
2. Age	\bar{x}	45.57	42.91	50.33
	minimum	39	32	43
	maximum	58	59	60
3. Education Level	Undergraduate	0.00	0.00	128 (71.1%)
	Bachelor's degree	9 (5.0%)	37 (20.6%)	52 (28.9%)
	Master's degree	171 (95.0%)	143 (79.4%)	0.00
4. Experience in doing agricultural learning activities (years)	≤ 5	133 (74.0%)	81 (45.0%)	88 (48.9%)
	5-10	47 (26.0%)	99 (55.0%)	90 (50.0%)
	10-15	0.00	0.00	2 (1.1%)
	\bar{x}	4.80	6.04	5.69
	minimum	2	2	1
	maximum	10	10	12

From the general characteristics of the target audience Teachers and community representatives answer these questions with the majority of the male population. people of working age or community representatives The average age was the highest (50.33 years), followed by the target group (45.57 years) and teachers (42.91 years). When studying the education level of the 3 sample groups, it was found that most school administrators graduated with a master's degree (95.0%), most teachers graduated with a master's degree (79.4%), and most community representatives graduated with a lower degree. Bachelor's degree (71.1%). In terms of experiences in agricultural learning activities, it was found that teachers had the highest average experience (6.04 years), followed by community representatives (5.69 years), and school administrators had average experiences (4.80 years).

4. 2 Attitudes towards agricultural learning activities of school administrators Teachers in charge of agricultural learning activities and community representatives who are school committees. It is shown in Table 2 as follows:

Table 2
Attitudes towards agricultural learning activities of school administrators Teachers in charge of agricultural learning activities and community representatives who are school committees



Point	Director	Teacher	Community Representative	F (sig)
	\bar{x} (S.D.) Meaning	\bar{x} (S.D.) Meaning	\bar{x} (S.D.) Meaning	
1. Agricultural learning activities are activities that help develop students' learning potential in agriculture.	5.00 (0.000) strongly agree	4.99 (0.750) strongly agree	4.98 (0.148) strongly agree	2.635 (0.073)
2. Agricultural learning activities are good activities. suitable for the age and maturity of the learners Including educational institutions and local contexts.	5.00 (0.000) strongly agree	4.97 (0.165) strongly agree	4.97 (0.180) strongly agree	2.892 (0.056)
3. Agricultural learning activities are activities that build good relationships between schools and communities.	4.97 (0.165) strongly agree	4.97 (0.165) strongly agree	4.93 (0.250) strongly agree	2.329 (0.098)
4. Agricultural learning activities are activities that encourage learners to work together as a team, help each other in thinking, working together, and helping each other solve problems.	4.96 (0.207) strongly agree	4.93 (0.250) strongly agree	4.93 (0.250) strongly agree	0.530 (0.589)
5. Agricultural learning activities are activities that should involve the community.	4.94 (0.240) strongly agree	4.96 (0.207) strongly agree	4.93 (0.250) strongly agree	0.443 (0.642)
6. Developing better agricultural learning activities will greatly benefit administrators, teachers, learners and communities.	4.96 (0.194) strongly agree	4.98 (0.128) strongly agree	4.96 (0.207) strongly agree	1.206 (0.300)



7. The process of participation between schools and communities can effectively promote the potential of organizing agricultural learning activities in schools. and become more effective	4.95 (0.219) strongly agree	4.93 (0.250) strongly agree	4.94 (0.240) strongly agree	0.231 (0.793)
8. The school should develop agricultural learning activities continuously and regularly.	4.96 (0.232) strongly agree	4.96 (0.221) strongly agree	4.93 (0.272) strongly agree	0.661 (0.517)
9. Agricultural learning activities can be used in everyday life. and can be used as a career path	4.98 (0.128) strongly agree	4.97 (0.165) strongly agree	4.96 (0.194) strongly agree	0.821 (0.441)
10. You support the organization of agricultural learning activities in the school with full strength and potential.	4.99 (0.075) strongly agree	4.98 (0.148) strongly agree	4.97 (0.180) strongly agree	1.765 (0.172)
Total	4.97 ^a (0.060) strongly agree	4.97 ^a (0.060) strongly agree	4.95 ^b (0.076) strongly agree	4.976 (0.007)**



From the study of attitudes toward agricultural learning activities of administrators, teachers and community representatives, it was found that overall, the 3 groups had a strong agreement attitude towards agricultural learning activities. and when considering various sub- issues which is a component of the overview of 10 items. It was found that each group's attitude was at the level of strongly agreeing on all sub- issues. But when comparing the attitude levels of the 3 groups by analysis of variance, it was found that all 3 groups had a statistically significant difference in mean attitudes at the significance level of 0.05. The group of administrators and teachers had the mean scores of the level of attitude were different from the group of community representatives. However, the group of administrators and the group of teachers had no difference in the mean scores of the attitude level.

4.3 The condition of organizing agricultural learning activities of the school It is shown in Table 3 as follows:

Table 3

The condition of organizing agricultural learning activities of the school.

Point	Frequency	Percentage (%)
1. Organizing agricultural learning activities		
1.1 Planting	58	32.22
1.2 Animal husbandry	36	20.00
1.3 Planting and animal husbandry	86	47.78
2. Person in charge of agricultural learning activities		
2.1 Teacher	180	100.00
3. Co-manager of agricultural learning activities		
3.1 Community enterprise	87	48.33
3.2 Head of health center	90	50.00
3.3 village headman	150	83.33
4. Experience in agricultural learning activities		
4.1 ≤ 5	89	49.44
4.2 5-10	91	50.56
5. Projects prepared for learning about agriculture		
5.1 This full project is for you	76	42.22
5.2 Agriculture, way of life	94	52.22
5.3 Educational Innovation (CSR) Life and Career Skills	180	100.00
5.4 Alternative agriculture	80	44.44
5.5 Agriculture for lunch	180	100.00
6. School policy on organizing agricultural learning activities		
6.1 Organic farming	25	13.89



6.2 Sufficiency economy	20	11.11
6.3 Organic farming and sufficiency economy	135	75.00
7. Goals or expectations of organizing agricultural learning activities		
7.1 Learning and have life skills	134	74.44
7.2 Can lead to a career	120	66.67
7.3 Raise the level of achievement Motivation to study	87	48.33
7.4 Develop desirable characteristics	88	48.89
7.5 Health promotion	78	43.33
8. The situation of organizing learning activities in agriculture		
8.1 Success		
8.1.1 Successful		
8.1.1.1 A lot	55	30.56
8.1.1.2 Moderate	77	42.78
8.1.1.3 Little	48	26.67
8.1.2 Unsuccessful	0	0.00
8.2 Problem/Barrier		
8.2.1 Lack of agricultural experts	88	48.89
8.2.2 Lack of budget	98	54.44
8.2.3 Lack of personnel	110	61.11
8.2.4 The condition of the area is not conducive to organizing activities.	132	73.33
8.2.5 Community uses chemicals	76	42.22

From the study of the state of agricultural learning activities of schools in Chiang Mai Province. Organization of agricultural learning activities for schools in Chiang Mai Nearly half (47.78%) are engaged in crop and animal husbandry activities. It looks like lessons learned and put into practice in growing kale, morning glory, mountain rice, mustard greens, mushrooms, bananas, salads, and raising catfish, cichlid fish, tilapia, and laying hens. As for those who are responsible for agricultural learning activities, all schools will let teachers be the main responsible, with teachers' responsibilities divided according to the level of teaching. and integration as appropriate in the school context. In addition, village headmen came to take care of and assist teachers in organizing agricultural learning activities as well. When studying the experience of organizing agriculture, it was found that about half (50.56%) had been operating for a period of 5- 10 years for the purpose of organizing all school activities. Its objectives are education innovation (CSR), life skills and careers. and agriculture for lunch. A study of school activity policies found that most schools (75.00%) had a policy on organic agriculture and sufficiency economy Most schools (74.44%) have goals or expectations. To enable students to learn, have life skills and be able to apply for a career.

When studying the success of school activities, it was found that administrators of all schools gave answers that the activities were successful



according to the set goals. which can be divided into 3 levels of success: very successful is an award or certificate as a model for curriculum development Students have higher academic achievement. and generate income. Moderate level means having received some of the aforementioned rewards and low level means having only one of the aforementioned characteristics. It was found that schools in Chiang Mai were very successful (30.55%), moderate (42.78%) and low (26.67%) respectively.

As for the problems/obstacles of schools in Chiang Mai, it was found that most (73.33%) had areas that were not conducive to organizing activities, followed by (61.11%), lack of personnel (54.44%), lack of budget (48.89%), lack of agricultural experts (42.22%) The community uses chemicals. making it an obstacle to planting organic crops, respectively.

5. Discussion

The following points based on the research results were discussed:

5.1 Most of the people responsible for organizing the 3 groups of agricultural learning activities were male. and in working age is a person with a relatively high level of education and have experience in working on agricultural learning activities Therefore, it is regarded as a person with the potential to manage this project. both supported by external agencies as a result, it has resulted in the success of organizing agricultural learning activities. (Brian & Kristin, 2015)

5.2 In terms of attitude towards organizing agricultural learning activities, all 3 groups strongly agreed on organizing agricultural learning activities. The people responsible for organizing activities had a good attitude towards agricultural learning activities resulting in willingness to practice. Good (1959) that is, when a positive attitude led to behaviors that wanted to do things that which leads to the success of work to achieve the goal.

However, all 3 groups had a statistically significant difference in mean attitudes. It was found that administrators and teachers had higher attitude scores than community representatives It is possible that personnel in educational institutions have better understanding of policies, principles, as well as receiving information about agricultural learning activities from their parent agencies rather than community representatives. and see the benefits that students and parents will receive. This is probably why the attitude score is higher than that of community representatives. (Sana, 2018 and Nirand, 2018)

5.3 The study of agricultural learning activities of schools in Chiang Mai province found that most schools had organized agricultural learning activities in the area of growing crops. and raising animals. The person who is responsible for the activity is the teacher because it is the role and duty of the teacher who must be responsible according to the curriculum. More than half of them have been engaged in agricultural learning activities for about 5- 10 years. Most of the projects conducted focus on training in vocational skills and providing food for children to eat (Apidet, 2017 and Carol, 2015). Activities have been implemented according to the policy set by the school, which is organic agriculture. and sufficiency economy Emphasis on students and communities to practice safe farming and use local factors of production for self-reliance in the community by



schools Expected students to learn and have skills to learn agriculture. Considering the success of organizing agricultural learning activities at schools in Chiang Mai. It was found that all schools gave an answer that the activities were achieved according to the goals set. But in this success is success at various levels, namely high, medium and low. Which depends on how much the school has enough space to organize agricultural learning activities. Has the budget been sufficient for organizing the event? In terms of success, it was found that about 1/3 of the schools were very successful. Nearly half had moderate success and about less than 1 in 3 were less successful. This is because the organizing committee of Garth has knowledge. and long experience Received support from other agencies as well as the community and received cooperation from students and parents, making most of them successful. From in-depth interviews It was found that many school administrators are eager to raise funds to support activities because they consider the interests of students and parents to receive. (Chana, 1996; Sanchana, 2018, and Chongrak, 2011).

In terms of obstacles, some schools are less successful. Provide information that the condition of the area is not conducive to activities such as sandy soil and insufficient water system for cultivation. Lack of operating budget and there is a lack of teachers who specialize in agriculture, making it possible to organize activities efficiently. Some remote schools will affect funding requests from local organizations. or other agencies (Chongrak, 2011).

6. Conclusion

From this study, it was found that the responsible personnel or most of the directors are male He is knowledgeable and experienced at quite a high level. have a positive attitude towards agricultural learning activities the event successful and achieve the goal make the school have lunch for the students and students have knowledge and skills in agriculture and able to help with the family's agricultural work. However, the organization of agricultural activities in schools still has a problem that prevents the activities to be carried out to their full potential. That is, some schools have areas that are not suitable for organizing agricultural learning activities. Lack of personnel with direct knowledge in agriculture and lack of budget.

7. Recommendations

7.1 Teachers with knowledge in agriculture should be encouraged to take responsibility for this activity.

7.2 Maintain standards or quality of agricultural learning activities for sustainable operation

7.3 Emphasis on community cooperation and local organizations as much as possible

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English Language Learning Approaches as Impacted by Culture in Myanmar University Learning Environment

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Abstract

Culture influences how we see the world, how we see the community that we live in, and how we communicate with each other. Being a part of a culture influences our learning, remembering, talking, and behaving. Therefore, culture determines to a great extent the learning and teaching approaches also. The focus of the current study is on cultural attitudes and approaches to English language learning in Myanmar context. Less attention has been given to how approaches to learning are influenced by cultural attitudes, beliefs and structures and the subsequent influence of these approaches on how students cope in education. The current research was undertaken as an initial exploratory work to examine the question of whether learning approaches developed in early learning experiences and developing from a particular cultural view impact on and prepare students for language learning. Cultures differ in how they perceive knowledge and learning in the expectations. Background information is provided on approaches to learning within the cultural context and a tried and tested instrument used to measure learners' approaches delivered through an online survey. Results on the appropriateness of these approaches to the current Myanmar university learning environment is considered, presented, and discussed.

Keywords: Learning approaches, English language learning, Culture, University learning environment

1. Introduction

Research in the area of learning approaches as impacted by culture dates back to the 1970s (Entwistle and Wilson 1970) and is ongoing. Work on defining different cultural approaches to learning occurs in the research, they argue that approaches to learning differ according to students' cultural backgrounds. If this is the case, it is vital that we take these backgrounds and approaches into consideration when working with our students. Later, research (Barakat 1993; Bel Fekih 1993; Kaylani 1996; Richardson, 2004) has reinforced the early findings that general cultural factors and approaches to learning in early education affect learning. In her analysis of textbooks used in government schools, O'Brien (2010) points out that though there is abundant communicative material in the textbooks, the approach in terms of correct output of syntactic and grammatical testing is based on a repetition of a given pattern, a learning approach she claims leads to rote memorization tasks that are fine at lower language levels but not a successful approach for working the complexities of a multi-layered text. He argues that the lack of individual freedom along with an inability or reluctance to



cultivate an individual learning approach has implications for the effective use of any communicative materials. The main methodology for the teaching of English is traditional memorization patterns (Osterloh 1986, McKay 1992, Wallace 1996, Mawgeed 1999) This is a learning approach that fills all subject areas in the school but is now being addressed by the Ministry of Education. Nevertheless, Martin also points out that students enjoyed the challenge of a new approach to learning when it was set up in the right way. Findings from the various studies both general and specific to the worlds inform the current study. Manikutty et al (2007) eager the issue of influence of prior learning in their article, 'Does Culture influence learning style in higher education?' and points to the importance of acknowledging the context in which learning takes place. They cite Hall who in 1990 explained that educational systems emerge from the cultures in which they are "embedded" (Manikutty et al, 2007, 71) and reflect the values of that culture. At tertiary level, the system reflects more the values, approaches and methodologies of the North American system than any local system. Manikutty et al (2007) define the difference between learning styles and learning approaches at the beginning. Learning approaches is seen as referring to "more situation specific competencies required for effective learning" (Manikutty et al, 2007,72). Manikutty et al set out to develop a theoretical framework around approaches to learning that can be tried and tested. They argue that culture and cultural values of countries/societies influence approaches to learning and impact future learning.

1.1 Categories of Learning

The three main categories of learning identified by researchers (Entwistle & Wilson 1970, 1977, Marton & Saljo 1976, Entwistle 1992, Entwistle & Tait 1995, Tait, Entwistle & McCune 1998) considered as influential in how learners learn are: deep, surface apathetic and strategic. These categories influence the learner by defining the factors that motivate him/ her as either intrinsic or extrinsic. These in turn result from a vision within the society and culture of what learning and knowledge are about and how success and failure are defined and viewed in the society.

1.1.1 Deep Learning

Deep learning (Marton, Hounsell, Entwistle, 2005) describes a learning process whereby learners seek knowledge for its own sake, are interested in ideas, are able to make connections between facts and ideas and use evidence as support for views and opinions. Such learners are more likely to emerge from a culture where they are encouraged to deal with discrepancies, can tolerate ambiguity and make independent learning decisions.

1.1.2 Surface Apathetic Learning

Surface apathetic learners (Tait, Entwistle & McCune, 1998) see no clear purpose in what they are doing, fail to comprehend and understand much of what they are doing, are limited by the syllabus and motivated primarily by a fear of failure. Such learners are likely to lack independence and intrinsic motivation and take a passive approach to learning.

1.1.3 Strategic Approach Learning



Strategic approach learners (Entwistle & Tait, 1995) have an organized approach to learning, manage their time, are motivated, and able to monitor and direct their own progress and learning. Such learners are generally extrinsically motivated, and learning has a functional value for them.

1.2 Focus of the Current Study

The focus of the current study is on cultural view impact and approaches to English language learning and teaching. The research explores the question of whether or not learning approaches developed in learning experiences and evolving from a particular cultural view impact on and prepare students for subsequent learning. Culture, as Rebecca Oxford (1990:441) points out, “is not the single factor, and although many other influences interfere, culture often does play a significant role in learning” as students adopt, often unconsciously, many of the practices from the culture in which they grow up. Cultures differ in how they present knowledge and the expectations they have of students. The current research considers students who take undergraduate English specialization course in an environment where English is not their primary language of communication and where they are also expected to adopt an analytical discursive approach to learning.

2. Research Method

The current study is qualitative research. It was undertaken to investigate the approaches to learning and teaching established by groups of learners in university level with a view to measuring the appropriateness of these approaches with the requirements of the university. Students (mostly aged between 18 to 25) enter the university after graduating from high school. As it is an online survey method, the Google form has been used to collect data. The participants are undergraduate and post graduate students (67 females and 35 male) from different universities in Myanmar. It Approaches to learning in the university are still quite traditional with the emphasis on memorizing from notes for examinations, rote learning. The medium of instruction in university is English and Myanmar. A growing number of students attend English specialization and though a small percentage display greater ability in writing, the major difference between these students and those from the other specializations can be seen in their ability to communicate orally. When other specialization students enter university, they take a foundation English course to reach the required level leading to the selection of a discipline for their graduate studies. A fundamental requirement to a university career is the ability to analyze, think critically, and make informed academic decisions through reading and writing. Overall, university requirements are a challenge for many of the students and it is of value to investigate approaches to learning by students and to investigate the appropriateness of these approaches to the requirements of the university. Prosser & Trigwell (1997) point out that “approaches to studying and perceptions of teaching are two of the most direct influences on the quality of student learning” (28). They argue that university students bring experiences and approaches with them that affect how they make sense of subsequent learning. It



is essential to understand this in order to help students succeed at university and adapt to the approach required of them.

3. Survey Instrument

This inventory has its origins in the Approaches to Studying Inventory (ASI) which was developed in the University of Lancaster in the late 1970s (Entwistle & Ramsden, 1983) and was designed to indicate the relative strengths of students' approaches in three main dimensions—deep, surface and strategic. Further details of the conceptual basis of this and similar inventories can be found in Biggs (1993), Richardson (2000), Entwistle & McCune (2004) and Entwistle (2009).

The first section of ASI (A) contains items relating to conceptions of learning. The second ASI (B) is a revised of the ASI (Approaches to Studying Inventory) which contains 52 items, although a shortened version of 18 items has also been developed. This section produces scores on Deep, Surface and Strategic Approaches. The final section ASI (C) invites students to indicate their preferences for different kinds of teaching. The adapted research instrument consists of three parts, the first of which asked a general question on what learning is with a range of suggestions and a second part of 52 questions designed to identify students as deep, surface or strategic learners based on their responses. A final question allowed students to give an opinion on their overall performance as learners. The participants are all Myanmar speaking students in Myanmar. The instrument was presented in an online format through one of the commercially available survey sites and 102 students participated in the study. It was presented in both English and Myanmar to ensure participants' comprehension of questions. It should be stressed here that the study is an exploratory work and requires more follow-up.

4. Results

The following discussion focuses on the main patterns that emerged from responses on the three approaches to learning identified by Entwistle et al.

4.1 Deep Approach Items

One set of deep approach items to learning seeks to review the importance of understanding and meaning to students.

4.1.1 Seeking Meaning

Four items (4, 17, 30, 43) are employed to measure approaches, the first of which is a general question on the importance of understanding the meaning of what is being learnt; two items look at the importance of meaning in reading and the fourth the need to understand what lies behind an assignment or project before tackling it. It is interesting to observe that the general question receives a high level of agreement from participants whereas the more specific focus on how one seeks meaning in reading and assignments suggests that students are not fully engaged in these activities.

4. * I usually set out to understand for myself the meaning of what we have to learn.

17. When I'm reading an article or book, I try to find out for myself exactly what the author means.

30.*When I am reading, I stop from time to time to reflect on what I am trying to learn from it.



43. Before tackling a problem or assignment, I first try to work out what lies behind it.

Table 1
Deep approach to learning: Seeking meaning

Sr No	Deep approach to learning : Seeking meaning.	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
1	4* I usually set out to understand for myself the meaning of what we have to learn.	0%	0%	25%	0%	75%	4.50	0.87	Very good
2	17 When I'm reading an article or book, I try to find out for myself exactly what the author means.	0%	25%	0%	0%	75%	4.25	1.30	Very good
3	30* When I am reading, I stop from time to time to reflect on what I am trying to learn from it.	0%	25%	0%	50%	25%	3.75	1.09	Very good
4	43 Before tackling a problem or assignment	0%	0%	0%	75%	25%	4.25	0.43	Very good



Sr No	Deep approach to learning : Seeking meaning.	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
	nt, I first try to work out what lies behind it.								
Average		0.00%	12.50%	6.25%	31.25%	50.00%	4.19	1.01	Very good

NOTE

1.00-2.33=Not good at all

2.34-3.66=Good

3.67-5.00=Very good

Regarding seeking meaning, most of the learners are very good at seeking meaning in different ways (Average Mean = 4.19). They are sure that they can set out to understand the meaning of what they have to learn (Mean= 4.50) which is the highest mean value among the items. Most learners can grasp the message the author wants to convey (Mean= 4.25). Reflection while reading gives the readers more chance to understand the text and use existing backgrounds for further guess. It also allows the readers to find what they try to learn from it. Some learners do reflection when they read. (Mean= 3.75). According to the data, most learners work out the difficulties or possibilities behind a problem or an assignment before they take actions to it. (Mean= 4.35).

4.1.2 Relating Ideas

Four items (11, 21, 33, 46) are employed to measure approaches.

11.* I try to relate ideas I come across to those in other topics or other courses whenever possible.

21.* When I'm working on a new topic, I try to see in my own mind how all the ideas fit together.

33.* Ideas in course books or articles often set me off on long chains of thought of my own.

46.* I like to play around with ideas of my own even if they don't get me very far.

*Table 2**Deep approach to learning: Relating ideas*

Sr No	Deep approach to learning : Relating ideas	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
11*	I try to relate	0%	0%	25%	0%	75%	4.50	0.87	Very good



S r N o	Deep approach to learning : Relating ideas	1=Stron gly disagre e	2=Disag ree	3=Neut ral	4=Agr ee	5=Stron gly agree	Me an	SD	Interpreta tion
	ideas I come across to those in other topics or other course s whene ver possibl e.								
2	21 * When I'm workin g on a new topic, I try to see in my own mind how all the ideas fit togeth er.	0%	0%	0%	50%	50%	4.5 0	0.5 0	Very good
3	33 * Ideas in course books or articles often set me off on long chains of though	0%	0%	25%	25%	50%	4.2 5	0.8 3	Very good



Sr No	Deep approach to learning : Relating ideas	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
	t of my own.								
4	46* I like to play around with ideas of my own even if they don't get me very far.	0%	0%	0%	0%	100%	5.00	0.00	Very good
Average		0.00%	0.00%	12.50%	18.75%	68.75%	4.56	0.70	Very good

NOTE

1.00-2.33=Not good at all

2.34-3.66=Good

3.67-5.00=Very good

According to the data, most learners can relate ideas well (Average mean= 4.56). Most learners use their prior knowledge to relate what they are reading and the things they have already come across in the past reading activities (mean= 4.50). They also figure out the way the ideas fit together well. Whenever they deal with a new topic, they agree that they relate one thing to another to get the whole figure (mean= 4.50). They also agree that once one idea gets stuck in their mind, it never goes out of their mind, and it becomes chain of thought (mean= 4.50). Most learners totally agree that they use ideas of their own while dealing with a text if it doesn't get them very far. (mean=5.00) which is the highest mean value.

4.1.3 Use of Evidence

Four items (9, 23, 36, 49) are employed to measure approaches.

9.* I look at the evidence carefully and try to reach my own conclusion about what I'm studying.

23.* Often I find myself questioning things I hear in lectures or read in books.

36.* When I read, I examine the details carefully to see how they fit in with what's being said.

49.* It's important for me to be able to follow the argument, or to see the reason behind things.

Table 3



Deep approach to learning: Use of evidence

S r N o	Deep approach to learning : Use of evidence	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
1	9* I look at the evidence carefully and try to reach my own conclusion about what I'm studying.	0%	0%	0%	25%	75%	4.75	0.43	Very good
2	23* Often I find myself questioning things I hear in lectures or read in books.	0%	0%	0%	75%	25%	4.25	0.43	Very good
3	36* When I read, I examine the details carefully to see how they fit in with what's being said.	0%	0%	0%	50%	50%	4.50	0.50	Very good
4	49* It's important for me to be able to follow the argument.	0%	0%	25%	75%	0%	3.75	0.43	Very good



S r N o	Deep approach to learning : Use of evidence	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
	nt, or to see the reason behind things.								
Average		0.00%	0.00%	6.25%	56.25%	37.50%	4.31	0.58	Very good

NOTE

1.00-2.33=Not good at all

2.34-3.66=Good

3.67-5.00=Very good

According to the data, most learners agree that they use given evidence while learning (Average mean= 4.31). They make sure of using evidence to reach own conclusion (mean= 4.75). They ask themselves about the things they hear in lectures or in books (mean= 4.25). Most learners examine the details carefully so that they can work out how things are in line with what is being said in the text (mean= 4.50). Some learners think it is important for them to know the reason or argument behind things (mean= 3.75).

4.1.4 Interest in ideas (Motivational aspect)

Four items (13, 26, 39, 52) are employed to measure approaches.

13.* Regularly I find myself thinking about ideas from lectures when I'm doing other things.

26. I find that studying academic topics can be quite exciting at times.

39.* Some of the ideas I come across on the course I find really gripping.

52. I sometimes get 'hooked' on academic topics and feel I would like to keep on studying them.

*Table 4**Deep approach to learning: Interest in ideas (Motivational aspect)*

S r N o	Deep approach to learning: Interest in ideas (Motivational aspect)	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
1	13* Regularly I find	0%	0%	0%	75%	25%	4.25	0.43	Very good



Sr No	Deep approach to learning: Interest in ideas (Motivational aspect)	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
	myself thinking about ideas from lectures when I'm doing other things.								
2	26 I find that studying academic topics can be quite exciting at times.	0%	25%	0%	50%	25%	3.75	1.09	Very good
3	39* Some of the ideas I come across on the course I find really gripping.	0%	0%	25%	75%	0%	3.75	0.43	Very good
4	52 I sometimes get 'hooked' on academic topics	0%	0%	25%	25%	50%	4.25	0.83	Very good



S r N o	Deep approach to learning: Interest in ideas (Motivational aspect)	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
	and feel I would like to keep on studying them.								
Average		0.00%	6.25%	12.50%	56.25%	25.00%	4.00	0.79	Very good

NOTE

1.00-2.33=Not good at all

2.34-3.66=Good

3.67-5.00=Very good

According to the data, most learners take an interest in ideas (Average mean= 4.25). Most learners do things at the same time. They can concentrate on other things while reading and thinking ideas from lecturers (mean= 4.25). They find the topics they learn mostly interesting (mean= 3.75). So, for most learners some of the ideas are attractive (mean= 3.75). Most learners get attached to the topics they read, and they keep thinking about the ideas (mean= 4.25).

4.1.5 Monitoring Effectiveness (Originally included in strategic, but now seen as more closely related to deep)

Four items (7, 20, 34, 47) are employed to measure approaches.

7. I go over the work I've done carefully to check the reasoning and that it makes sense.

20 I think about what I want to get out of this course to keep my studying well focused.

34. Before starting work on an assignment or exam question, I think first how best to tackle it.

47. When I have finished a piece of work, I check it through to see if it really meets the requirements.



Table 5
Deep approach to learning: Monitoring Effectiveness (Originally included in strategic, but now seen as more closely related to deep)

S r N o	Deep approach to learning: Monitoring effectiveness (Originally included in strategic, but now seen as more closely related to deep)		1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
	1	7	I go over the work I've done carefully to check the reasoning and that it makes sense.	0%	0%	0%	50%	50%	4.50	0.50
2	20	I think about what I want to get out of this course to keep my studying well focused.	0%	0%	25%	25%	50%	4.25	0.83	Very good
3	34	Before starting work on an assignment or exam	25%	0%	0%	25%	50%	3.75	1.64	Very good



	Deep approach to learning: Monitoring effectiveness (Originally included in strategic, but now seen as more closely related to deep)	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
	question, I think first how best to tackle it.								
4	47. When I have finished a piece of work, I check it through to see if it really meets the requirements.	0%	0%	0%	50%	50%	4.50	0.50	Very good
Average		6.25%	0.00%	6.25%	37.50%	50.00%	4.25	1.03	Very good

NOTE

1.00-2.33=Not good at all

2.34-3.66=Good

3.67-5.00=Very good

Regarding monitoring effectiveness, most learners can get the effectiveness (Average mean= 4.25). They go over the work to make sense (mean= 4.50). Some learners want to keep their studying focused more (mean= 4.25). Most learners prepared and thought ahead the ways to deal with the assigned tasks before starting (mean= 3.75). Most learners agree that they check them again whenever they finished work (mean= 4.50).

4.2 Strategic Approach to Studying

One set of strategic approach items to learning seeks to review that learning has a functional value.



4.2.1 Organised Studying

Four items (1, 14, 27, 40) are employed to measure approaches.

- 1. I manage to find conditions for studying which allow me to get on with my work easily.
- 14.* I think I'm quite systematic and organised when it comes to revising for exams.
- 27.* I'm good at following up some of the reading suggested by lecturers or tutors.
- 40.* I usually plan out my week's work in advance, either on paper or in my head.

Table 6
Strategic approach to studying: Organised studying

S r N o	Strategic approaches to studying: Organised studying	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
1	1 I manage to find conditions for studying which allow me to get on with my work easily.	0%	0%	25%	75%	0%	3.75	0.43	Very good
2	14* I think I'm quite systematic and organised when it comes to revising	0%	25%	0%	25%	50%	4.00	1.22	Very good



S r N o	Strategic approaches to studying: Organised studying	1=Stro ngly disagre e	2=Disa gree	3=Neu tral	4=Ag ree	5=Stro ngly agree	Me an	SD	Interpret ation
	g for exams.								
3	I'm good at followi ng up some of the readin g sugges ted by lecture rs or tutors.	0%	0%	0%	75%	25%	4.2 5	0. 43	Very good
4	I usually plan out my week's work in advanc e, either on paper or in my head.	0%	0%	0%	75%	25%	4.2 5	0. 43	Very good
Average		0.00%	6.25%	6.25%	62.50 %	25.00 %	4.0 6	0. 75	Very good

NOTE

1.00-2.33=Not good at all

2.34-3.66=Good

3.67-5.00=Very good

Regarding how they organize their studies, most learners can organize their studying well (Average mean= 4.06). Most manage well to get their work done easily (mean= 3.75). Before the exam, they are quite well organized and



systematic (mean= 4.00). Most agree that they manage to find conditions for studying and they are good at following up some of the reading suggested by lecturers or tutors (mean= 4.25). They schedule what they are going to do in advance by writing them down (mean= 4.25).

4.2.2 Time Management

Four items (5, 18, 31, 44) are employed to measure approaches.

- 5. I organise my study time carefully to make the best use of it.
- 18.* I'm pretty good at getting down to work whenever I need to.
- 31.* I work steadily through the term or semester, rather than leave it all until the last minute.
- 44.* I generally make good use of my time during the day.

*Table 7
Strategic approach to studying: Time management*

Sr No	Strategic approaches to studying: Time management	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
1	5 I organise my study time carefully to make the best use of it.	0%	0%	0%	25%	75%	4.75	0.43	Very good
2	18* I'm pretty good at getting down to work whenever I need to.	0%	0%	75%	25%	0%	3.25	0.43	Good
3	31* I work steadily	0%	0%	0%	0%	100%	5.00	0.00	Very good



S r N o	Strategic approache s to studying: Time managemen t	1=Stro ngly disagre e	2=Disa gree	3=Neu tral	4=Ag ree	5=Stro ngly agree	Me an	SD	Interpret ation	
	y throug h the term or semes ter, rather than leave it all until the last minut e.									
4	4 4*	I gener ally make good use of my time during the day.	0%	0%	25%	25%	50%	4.2 5	0. 83	Very good
Average			0.00%	0.00%	25.00 %	18.75 %	56.25 %	4.3 1	0. 85	Very good

NOTE

1.00-2.33=Not good at all

2.34-3.66=Good

3.67-5.00=Very good

Most learners can manage their time (Average mean= 4.31). Most learners agree that they organize the time very well to make use of it (mean= 4.75). But some are not sure of their abilities to get down to work (mean= 3.25). while all strongly agree that they work continuously and steadily from the beginning of the academic year (mean= 5.00). Some learners make good use of their time (mean= 4.25).



4.2.3 Achieving (Motivational Aspect)

Four items (10, 24, 37, 50) are employed to measure approaches.

10.* It's important to me to feel that I'm doing as well as I really can on the courses here.

24. I feel that I'm getting on well, and this helps me put more effort into the work.

37.* I put a lot of effort into studying because I'm determined to do well.

50.* I don't find it at all difficult to motivate myself.

Table 8

Strategic approach to studying: Achieving (Motivational aspect)

Sr No	Strategic approaches to studying: Achieving (Motivational aspect)	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
1	10* It's important to me to feel that I'm doing as well as I really can on the courses here.	0%	0%	0%	25%	75%	4.75	0.43	Highly motivated
2	24 I feel that I'm getting on well, and this helps me put more effort into the work.	0%	0%	0%	50%	50%	4.50	0.50	Highly motivated
3	37* I put a lot of effort into studying	0%	0%	0%	50%	50%	4.50	0.50	Highly motivated



Sr	No	Strategic approaches to studying: Achieving (Motivational aspect)	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
		because I'm determined to do well.								
4	50*	I don't find it at all difficult to motivate myself.	25%	0%	25%	25%	25%	3.25	1.48	motivated
Average			6.25%	0.00%	6.25%	37.50%	50.00%	4.25	1.03	Highly motivated

NOTE
 1.00-2.33=Not motivated
 2.34-3.66= Motivated
 3.67-5.00=Highly motivated

According to the data, they are highly motivated (Average mean= 4.75). They keep in mind that they can rally do the course (mean= 4.75). So, they feel satisfied themselves and this helps them put more effort into the work (mean= 4.50) and some learners put a lot of effort into studying (mean= 4.50). and they are much motivated (mean= 3.25).

4.2.4 Alertness to Assessment Demands (Loads with strategic in some studies, but now seen as a distinct aspect)

- Four items (2, 15, 28, 41) are employed to measure approaches.
- 2. When working on an assignment, I'm keeping in mind how best to impress the marker.
 - 15.* I look carefully at tutors' comments on course work to see how to get higher marks next time.
 - 28. I keep in mind who is going to mark an assignment and what they're likely to be looking for.
 - 41.* I keep an eye open for what lecturers seem to think is important and concentrate on that.

Table 9



Strategic approach to studying: Alertness to assessment demands (Loads with strategic in some studies, but now seen as a distinct aspect)

Sr	No	Strategic approaches to studying: Alertness to assessment demands (Loads with strategic in some studies, but now seen as a distinct aspect)	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
1	2	When working on an assignment, I'm keeping in mind how best to impress the marker.	0%	0%	0%	50%	50%	4.50	0.50	Always feel on high alert
2	15*	I look carefully at tutors' comments on course work to see how to get higher marks next time.	0%	0%	25%	0%	75%	4.50	0.87	Always feel on high alert
3	28	I keep in mind who is going to mark an	0%	0%	0%	50%	50%	4.50	0.50	Always feel on high alert



S r N o	Strategic approaches to studying: Alertness to assessment demands (Loads with strategic in some studies, but now seen as a distinct aspect)	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
	assignment and what they're likely to be looking for.								
4	41* I keep an eye open for what lecturers seem to think is important and concentrate on that.	0%	0%	0%	50%	50%	4.50	0.50	Always feel on high alert
Average		0.00%	0.00%	6.25%	37.50%	56.25%	4.50	0.61	Always feel on high alert

NOTE

1.00-2.33=Not alert/Unaware

2.34-3.66=Staying alert

3.67-5.00=Always feel on high alert

According to the data, most all learners strongly agree that when they are working on an assignment, they make sure to impress the markers, to get higher



marks at next exams by paying attention to the instructors' comments and suggestions, to fulfil what the markers are looking for in the answers by students and to keep an eye open for lecturers seem to think is important and concentrate on that. (Average mean= 4.50).

4.3 Surface Approach

This dimension has also been called 'surface apathetic' or 'instrumental' in some publications

One set of surface approach items to learning seeks to review that learning has a clear purpose.

4.3.1 Lack of Purpose (Sometimes separates out as a distinct aspect)

Four items (3, 16, 29, 42) are employed to measure approaches.

3.*Often I find myself wondering whether the work I am doing here is really worthwhile.

16.* There's not much of the work here that I find interesting or relevant.

29.* When I look back, I sometimes wonder why I ever decided to come here.

42.*I'm not really interested in this course, but I have to take it for other reasons.

Table 10

Surface Approach: Lack of purpose (Sometimes separates out as a distinct aspect)

S	r	N	o	Surface Approach: Lack of purpose (Sometimes separates out as a distinct aspect)	1=Stro	2=Disa	3=Neu	4=Ag	5=Stro	Me	SD	Interpret
				ngly	agree	tral	ree	ngly	an	SD	ation	
					ngly	agree	tral	ree	ngly	an	SD	ation
1	3*			Often I find myself wondering whether the work I am doing here is really worthwhile.	0%	25%	0%	0%	75%	4.25	1.30	Having full of purposes
2	16*			There's not much of the	25%	50%	25%	0%	0%	2.00	0.71	Having no purpose



S r N o	Surface Approach: Lack of purpose (Sometimes separates out as a distinct aspect)	1=Stro ngly disagr ee	2=Disa gree	3=Neu tral	4=Ag ree	5=Stro ngly agree	Me an	SD	Interpret ation
	work here that I find interest ing or relevan t.								
3	2 9* When I look back, I someti mes wonder why I ever decided to come here.	0%	25%	50%	0%	25%	3.2 5	1. 09	Having purpose
4	4 2* I'm not really interest ed in this course, but I have to take it for other reasons	25%	0%	25%	50%	0%	3.0 0	1. 22	Having purpose
Average		12.50 %	25.00 %	25.00 %	12.5 0%	25.00 %	3.1 3	1. 36	Having purpose

NOTE

1.00-2.33=Having no purpose

2.34-3.66=Having purpose

3.67-5.00=Having full of purposes

According to the data, most learners are lack of purpose especially in the work which they find themselves doubtful. (Average mean= 3.13). Most learners feel



that they are not really interested or relevant to them (Average mean= 2.00). They want to know the reasons for the decisions they made to do so (Average mean= 3.25) and they have other reasons to do it even though they do not take an interest (Average mean= 3.00).

4.3.2 Unrelated Memorising

Four items (6, 19, 32, 45) are employed to measure approaches.

6.* I find I have to concentrate on just memorising a good deal of what I have to learn.

19.* Much of what I'm studying makes little sense: it's like unrelated bits and pieces.

32.* I'm not really sure what's important in lectures, so I try to get down all I can.

45.* I often have trouble in making sense of the things I have to remember.

Table 11
Surface Approach: Unrelated memorizing

Sr	No	Surface Approach: Unrelated memorising	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
1	6*	I find I have to concentrate on just memorising a good deal of what I have to learn.	0%	0%	25%	50%	25%	4.00	0.71	Having the ability to recall the accurate and detailed information
2	19*	Much of what I'm studying makes little sense: it's like unrelated bits and pieces.	50%	0%	25%	25%	0%	2.25	1.30	Not having the ability to recall the accurate and detailed information



Sr No	Surface Approach: Unrelated memorising	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
3	I'm not really sure what's important in lectures, so I try to get down all I can.	0%	0%	0%	75%	25%	4.25	0.43	Having the ability to recall the accurate and detailed information
4	I often have trouble in making sense of the things I have to remember.	0%	0%	0%	75%	25%	4.25	0.43	Having the ability to recall the accurate and detailed information
Average		12.50 %	0.00%	12.50 %	56.25 %	18.75 %	3.69	1.16	Having the ability to recall the accurate and detailed information

NOTE

1.00-2.33=Not having the ability to recall the accurate and detailed information

2.34-3.66=Having the ability to recall the general information

3.67-5.00=Having the ability to recall the accurate and detailed information

Most learners can recall the accurate and detailed information (Average mean= 3.69). Most learners find conditions that can help them get on with their work easily. They have to concentrate on just memorizing a good deal of what they have to learn (mean= 4.00). Most learners find it difficult to relate ideas and to make sense through unrelated pieces of information they learnt (mean= 2.25). Regarding the ability, they are not sure what the important things are (mean=



4.25). Most learners agree that they can't make sense of the things they have to remember (mean= 4.25).

4.3.3 Fear of Failure (Motivational aspect)

Four items (8, 22, 35, 48) are employed to measure approaches.

8.* Often I feel I'm drowning in the sheer amount of material we're having to cope with.

22.* I often worry about whether I'll ever be able to cope with the work properly.

35. I often seem to panic if I get behind with my work.

48. Often, I lie awake worrying about work I think I won't be able to do.

Table 13

Surface approach: Fear of failure (Motivational aspect)

Surf	Approach:	1=Stro	2=Disa	3=Neu	4=Ag	5=Stro	Me	SD	Interpret
no	Fear of failure (Motivational aspect)	ngly disagree	gree	tral	ree	ngly agree	an		ation
1	8* Often, I feel I'm drowning in the sheer amount of material we're having to cope with.	0%	25%	25%	25%	25%	3.50	1.12	fearful
2	22* I often worry about whether I'll ever be able to cope with	0%	0%	0%	50%	50%	4.50	0.50	Showing great fear



S r N o	Surface Approach: Fear of failure (Motivational aspect)	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
	the work properly.								
3	35 I often seem to panic if I get behind with my work.	0%	0%	0%	50%	50%	4.50	0.50	Showing great fear
4	48 Often, I lie awake worrying about work I think I won't be able to do.	0%	0%	50%	25%	25%	3.75	0.83	Showing great fear
Average		0.00%	6.25%	18.75%	37.50%	37.50%	4.06	0.90	Showing great fear

NOTE

1.00-2.33=Fearless

2.34-3.66=Fearful

3.67-5.00=Showing great fear

Most learners feel that they are fear of failure (Average mean= 4.06). They have to deal with much information and almost flooded with information or materials (mean= 3.50). But most agree that they feel suspicious whether they can cope with the problems well or not (mean= 4.50). Most learners seem to panic if they get behind their work (mean= 4.50). Some learners fear that they think they won't be able to do (mean= 3.75).

4.3.4 Syllabus-boundness (Does not contribute to the overall score effectively in all subject areas)



- Four items (12, 25, 38, 51) are employed to measure approaches.
- 12.* I tend to read very little beyond what is actually required to pass.
25. I concentrate on learning just those bits of information I have to know to pass.
- 38.* I gear my studying closely to just what seems to be required for assignments and exams.
51. I like to be told precisely what to do in essays or other assignments.

Table 14

Surface approach: Syllabus-boundness (Does not contribute to the overall score effectively in all subject areas)

Sr No	Surface Approach: Syllabus-boundness (Does not contribute to the overall score effectively in all subject areas)	1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
1	12* I tend to read very little beyond what is actually required to pass.	0%	75%	0%	25%	0%	2.50	0.87	Middle between syllabus bound and syllabus free
2	25 I concentrate on learning just those bits of information I have to know to pass.	0%	25%	25%	25%	25%	3.50	1.12	Middle between syllabus bound and syllabus free
3	38* I gear my studying closely to just	0%	0%	0%	50%	50%	4.50	0.50	Syllabus bound



S r N o	Surface Approach: Syllabus-boundness (Does not contribute to the overall score effectively in all subject areas)		1=Strongly disagree	2=Disagree	3=Neutral	4=Agree	5=Strongly agree	Mean	SD	Interpretation
			what seems to be required for assignments and exams.							
4	51	I like to be told precisely what to do in essays or other assignments.	0%	0%	0%	25%	75%	4.75	0.43	Syllabus bound
Average			0.00%	25.00%	6.25%	31.25%	37.50%	3.81	1.18	Syllabus bound

NOTE

1.00-2.33=Syllabus free

2.34-3.66=Middle between syllabus bound and syllabus free

3.67-5.00=Syllabus bound

Regarding the syllabus bound, most learners are syllabus bound (Average mean= 3.81). Some tend to read much beyond what is actually required to pass (mean= 2.50). And they just concentrate on bits of information they must know (mean= 3.50). They gear the studying closely to just what seems to be required for assignments and exams (mean= 4.50). They agree that they like to be well instructed or guided in the assignments they are going to do (mean= 4.75). Most are between syllabus bound and syllabus free.

Based on the above data, the three approaches, deep approach, strategic approach and surface approach have been studied through the use of ASI.



Table 15
Relative strengths of student's approaches

Sr No	Sub theme	Approaches	Mean	SD	Interpretation
I	Deep Approach				
	a	Seeking meaning	4.19	1.01	In practice, it is always completely applied
	b	Relating ideas	4.56	0.70	In practice, it is always completely applied
	c	Use of evidence	4.30	0.58	In practice, it is always completely applied
	d	Interest in ideas	4.00	0.79	In practice, it is always completely applied
	Average		4.27	0.81	In practice, it is always completely applied
II	Strategic Approach				
	a	Organized studying	4.25	1.03	In practice, it is always completely applied
	b	Time management	4.06	0.75	In practice, it is always completely applied
	c	Alertness to assessment	4.31	0.85	In practice, it is always completely applied
	d	Achieving	4.25	1.03	In practice, it is always completely applied
	e	Monitoring effectiveness	4.50	0.61	In practice, it is always completely applied
	Average		4.28	0.88	In practice, it is always completely applied
III	Surface Approach				
	a	Lack of purpose	3.13	1.36	In practice, it is often applied
	b	Unrelated memorizing	3.69	1.16	In practice, it is always completely applied
	c	Syllabus-boundness	4.06	0.90	In practice, it is always completely applied



Sr No	Sub theme	Approaches	Mean	SD	Interpretation
	d	Fear of failure	3.81	1.18	In practice, it is always completely applied
Average			3.67	1.21	In practice, it is always completely applied

NOTE:

1.00-2.33=In practice, it is sometimes applied

2.34-3.66=In practice, it is often applied

3.67-5.00=In practice, it is always completely applied

Regarding to the approaches to studying, the strategic learning approach (Average mean= 4.28) is the dominant approach by the participants followed by the deep approach (Average mean= 4.27). and the least surface approach (Average mean= 3.67). Although the overall mean of the strategic approach is completely applied, the individual mean score of time management (Average mean= 4.06) by the learners is lower than the other items. The overall mean score of the interest in ideas is the least (Average mean= 4.00) show that they do not take much interest in ideas. It can be said that the learners are lack of purpose (Average mean= 3.13). The learners know the effectiveness and when they are well monitored, they can experience the effectiveness (mean= 4.50). They are very alert to the assessment (mean= 4.31), while they are not good at using evidence in their reading (mean= 4.30).

5. Discussion

Since the early 1980s, teaching and learning through the medium of English in foreign language environments have been influenced largely by the communicative approach to language acquisition in Myanmar. Consequently, little attention has been given to the context of learners and the prior linguistic and cultural approaches to learning that learners bring to the learning situation. Most Myanmar universities do not rate independence, creativity, or completion of imaginative tasks too highly. Some classes were found to be teacher centered, traditional in teaching methodologies with success measured by examination outcomes and grades. Memorization and rote learning were found to be still important to the Myanmar students and consequently these students were found not to be able to take advantage of a system that required them to do extensive reading and writing. It is assumed that if students are subjected to a learning approach based on principles that promise to make them analytical learners that they will metamorphose into efficient language users and critical thinkers. It was also assumed that the students were likely to display many more deep or strategic rather than surface indifferent approaches to learning. The results show that the students, in general, view themselves as engaged with ideas though not necessarily able to effectively engage with ideas in reading texts and with those required in assignments. It also appears that students may feel overwhelmed by the amount of work they have to cope with throughout the university and they



question their purpose in doing this work which perhaps leads to fear of failure that is a real problem for students. Generally, most of the students perceive themselves as doing well in their university courses. The majority also feel they need close guidance and support when undertaking essays and assignments. It is also interesting to note that rote learning or memorization does not feature greatly as a learning strategy, though much has been written about the prevalence of rote memorization as one of the main approaches to learning in the context. In particular, students can be said to show a strategic approach to learning as the focus in assignments is overwhelmingly on how to get a good grade. Motivation can be defined as of the extrinsic type as almost all students cite doing well and getting a good grade as of primary importance. If we want to classify learners according to one of the three accepted categories, it will appear that they have a strategic approach to learning. It is commonly acknowledged that this approach guides many students and can have a positive impact on learning. Where students need quite a lot of support is in developing a more independent, self-reliant approach to learning and this should be in-built into materials and methods in any course.

6. Limitations

This research, as indicated already, is an initial exploratory work and needs extensive follow up. However, no formal research has been undertaken before in the educational system on the effects of culture on learning approaches and hence this study is an original contribution in the area. Limitations of time and method of presenting the survey prevented the comparison of results across the three academic levels. Some of the results confirm perceptions about the presence of an approach or approaches to learning that may not always facilitate the approach required at the university particularly in terms of independent questioning, engaging critically with reading texts, exploring and developing academic texts based on analysis and evidence. There is clearly scope for further study as a valuable tool to inform revision of courses and learning approaches at the university and as a tool with great input potential for revisions to programs.

7. Recommendation

Further study may have to focus on other several demographic factors such as educational achievement, race, gender. It is also recommended that future study may consider using current questionnaire to reflect more learning approaches as impacted by culture in Myanmar University Learning Environment.

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The Culturally Responsive Teacher Preparedness of University English Teachers in Myanmar

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Abstract

The purpose of this study is to investigate the competencies of culturally responsive teaching of English teachers in Myanmar via the Culturally Responsive Teacher Preparedness Scale (CRTPS). Competencies listed in the scale were identified through literature reviews and input from experts. There were three factors for CRTPS: curriculum and instruction, relationship and expectation establishment, and group belonging formation. In terms of curriculum and instruction, according to the data, this factor has shown the highest mean value of EFL teachers' preparedness for culturally responsive teaching among the three factors. This factor includes the areas on: (a) knowing the subject and students, (b) engaging in reflective teaching, (c) identifying resources, and (d) promoting learners' performance. The factors of designing culturally relevant curricula and establishing cultural harmony in classroom instruction are also included.

Keywords: Culturally responsive teacher, Culturally responsive teaching, Preparedness, University English teachers, Myanmar

1. Introduction

Educating culturally diverse students has become one of the vital issues in education. It has been indicated that teachers' knowledge, beliefs, and attitudes are highly correlated with students' races, ethnicities, and the qualities of education that they receive (Gay, 2002a). To successfully teach students from culturally and linguistically diverse backgrounds, culturally responsive teaching, as an equitable and culturally sensitive instruction practice, has been advocated by many scholars and organizations (Gay, 2002a; Siwatu, 2007; Wlodkowski, 1999). If teachers can understand students' backgrounds and teach in a culturally responsive way, several critical educational problems might be alleviated, such as low academic achievement and the disproportionate representation in special education (Blanchett, 2006; Gay, 2002a). That is, implementing culturally responsive teaching does not only improve academic achievement of diverse students (Gay 2002a; Plata 2008), but also benefit all students (Barnes, 2006; Plata, 2008).

Being responsive means reacting appropriately in the instructional context (Irvine & Armento, 2001). Bowers and Flinders (as quoted in Irvine & Armento, 2001, p. 5) also proposed that "being responsive means to be aware of and capable of responding in educationally constructive ways to the ways in which cultural patterns influence the behavioural and mental ecology of the classroom." Cultural responsiveness could represent all aspects of the above concepts and include the



meaning of connection between home or community culture and school culture (Pewewardy & Hammer, 2003). Therefore, the term, cultural responsiveness is used in this study. Gay (2002a, p. 619) proposed that “culturally responsive teaching is a comprehensive endeavour that is engendered in all dimensions of the educational enterprise, including diagnosing students’ needs, curriculum content, counselling and guidance, instructional strategies, and performance assessment.” Several scholars have emphasized the need of cultivating preservice teachers to acquire culturally responsive teaching competencies in teacher preparation programs (Gay, 2005; Spanierman et al., 2011).

Since culturally responsive teaching is a teaching pedagogy that teachers can implement in their classrooms to instruct their students from different cultural backgrounds, various frameworks are used as bases to classify the culturally responsive teaching competencies. Usually, researchers use categories, components, domains, aspects, or major competencies to organize culturally responsive teaching competencies (Gay, 2002b; Hollins, 1993; Siwatu, 2006). Under a specific framework, researchers list some competencies to describe the ability of culturally responsive teachers more clearly, and thus can help teachers to be familiar with implementing culturally responsive teaching. Hollins (1993) reviewed four seminal studies in order to create a knowledge base to identify teacher behaviours or actions that can improve learning of diverse students. According to the analysis of the reviewed literature, she suggested that there are seven specific competencies for teaching diverse populations: (a) communicating with diverse learners, (b) knowing subject and students, (c) reflective teaching, (d) identifying resources, (e) creating a supportive context, (f) developing interpersonal relationships, and (g) promoting learner performance. Gay (2002b) expanded these competencies to include: (a) developing a cultural diversity knowledge base, (b) designing culturally relevant curricula, (c) demonstrating cultural caring, (d) building a learning community, (e) establishing cross-cultural communications, and (f) establishing cultural congruity in classroom instruction. However, Siwatu (2006) grouped the culturally responsive teaching competencies into four categories: (a) curriculum and instruction, (b) classroom management, (c) student assessment, and (d) cultural enrichment. He presented competencies derived from theoretical discussions and quantitative and qualitative studies that documented the practices of culturally responsive teachers. Under the four categories, he put forth a total of 29 competencies.

From aforementioned literature, Gay (2002b) separated culturally responsive curriculum and instruction into different domains, while Siwatu (2006) combined them together as one category (curriculum and instruction). Hollins’ (1993) knowing subjects, engaging in reflective teaching, and identifying resources could be considered as design of curriculum and instruction. Moreover, all of them proposed that creating a caring environment and supporting students were important elements of culturally responsive teaching. Both Gay (2002b) and Hollins (1993) put forth communication as one specific category. Besides, developing a cultural diversity knowledge base (Gay, 2002b), developing interpersonal relationship (Hollins, 1993), managing classroom and assessing students (Siwatu, 2007) are also viewed as important elements of culturally responsive teaching.



Many efforts, through employing qualitative and quantitative methods, have advanced the assessment of culturally responsive teaching competencies for preservice and inservice teachers (Spanierman et al., 2011). These methods include observations of classroom teaching, parent and/or student ratings of teachers, focus group discussions, and survey of preservice teachers. For example, Stanley (1996) developed an instrument, the Pluralism and Diversity Attitude Assessment, to assess preservice teachers' attitude toward diverse students. Spanierman et al. (2011) used a psychometrical method to develop a self-report scale for assessing teachers' culturally responsive competencies. Spanierman et al. (2011) found that the tripartite model, which included multicultural belief/attitude, knowledge, and skill competencies developed by Sue et al. (1982), was reduced to two constructs: knowledge and skills. That is, they did not find multicultural teaching awareness to be a viable factor to assess teachers' culturally responsive competencies.

Although previous studies clearly identify culturally responsive teaching competencies for preservice teachers and develop several scales to evaluate how preservice teachers possess these competencies, to the researcher's knowledge no psychometric scale was developed to evaluate the level of preparedness perceived by preservice teachers for culturally responsive teaching. Since multiple methods used to access students' competencies for culturally responsive teaching could help teacher preparation programs understand their effectiveness in training teachers from different aspects (Spanierman et al., 2011) and improve their programs, the purpose of this study was to develop a multidimensional scale to examine preservice teachers' sense of preparedness to execute the practices associated with culturally responsive teaching. The definition of culturally responsive teachers for this study is the preservice teachers who will be culturally responsive in their classroom instruction to their diverse students, including identifying students' needs, communicating with students and parents, designing and implementing curricula and teaching, creating a caring and supporting setting and enriching students' diverse cultures. There are three objectives for the current study:

- 1) To explore the English teachers' preparedness on the curriculum and instruction of culturally responsive teaching?
- 2) To investigate their relationship and expectation establishment with culturally diverse students
- 3) To find out their group belonging formation to form a culturally responsive atmosphere?

2. Method

This study uses a survey method to collect data and an exploratory factor analysis to explore the underlying constructs of the various identified competencies in developing a preparedness scale and further validates estimates of the scale across comparison groups. It is a qualitative method.

2.1 Participants

Participants were recruited from English programs at two universities in Myanmar. A total of 20 teachers participated in the study. They have been teaching English for more than 10 years. Some have international experience as a scholar.



They are from two universities in Myanmar. The researcher distributed the questionnaire to them to rate their preparedness level for culturally responsive teaching. After the survey, the data analysis procedure has been done. Among these participants, -- (16%) were female and -- (4%) were male. The age range of the participants was from 29 to 64 years old.

2.2 Instrumentation

The survey instrument was divided into two sections. The first section included 18 culturally responsive teaching competencies refined from the literature. The instrument used four aspects to identify competencies. These aspects were: (a) curriculum and instruction, (b) classroom management, (c) student assessment, and (d) cultural enrichment (Siwatu, 2006). The questionnaire was distributed online. A total of 18 competencies were identified in the questionnaire. The competencies were rated on a 5-point Likert scale, ranging from unprepared to fully prepared, respectively. Participants were guided to self-rate each competency to indicate their preparedness. Each competency had the same stem "I am able to" and asked about competency contents, such as "communicate expectations of success to culturally diverse students," "motivate the curriculum and thematic units with the culture of students represented in the classroom," and "create a warm, supporting, safe, and secure classroom environment for culturally diverse students."

2.3 Data Collection and Analysis Procedures

The first objective is to examine the English teachers' preparedness on the curriculum and instruction of culturally responsive teaching while the second research question is to initially investigate their relationship and expectation establishment with culturally diverse students and group belonging formation to form a culturally responsive atmosphere. After the questionnaire items were identified and approved, data were collected from English teachers. They completed the questionnaire which were used for the factor analysis. Factor analysis is used to "identify the factor structure or model for a set of variables" (Henson & Roberts 2006, p. 395). An exploratory factor analysis was applied, since the purpose of this study was to apply a CRTPS for the investigate the teacher preparation level. In addition, the categories, components or aspects of these competencies from literature were used as references to name the underlying factor structure after the factor analysis.

3. Results

The dimensionality of the 18 items from the survey instrument was applied in this analysis. These three factors are as follows: curriculum and instruction (factor 1), relationship and expectation establishment (factor 2), and group belonging formation (factor 3). There were total of 18 items in the scale.

Table 1

English teachers' responses on the characteristics of culturally responsive teaching



	Items	Strongly Disagree	Disagree	Not Decided	Agree	Strongly Agree	Mean	SD	Interpretation
Factor 1: Curriculum and Instruction									
1	I am able to motivate the curriculum and thematic units with the culture of students represented in the classroom.	0%	25%	25%	30%	20%	3.45	1.07	Suitably prepared
2	I am able to review and assess curricula and instructional materials to determine their multicultural strengths and weakness, and relevance to students' interest and instructional needs, and revise them if necessary.	0%	15%	20%	20%	45%	3.95	1.12	Fully prepared
3	I am able to develop a collection of instructional examples that are culturally familiar to	40%	50%	10%	0%	0%	1.70	0.64	Unprepared



	Items	Strongly Disagree	Disagree	Not Decided	Agree	Strongly Agree	Mean	SD	Interpretation
	students to serve as a scaffold for learning.								
4	I am able to find ways to support language acquisition and enhance culturally and linguistically diverse students' comprehension of classroom tasks	0%	40%	0%	40%	20%	3.40	1.20	Suitably prepared
5	I am able to use a variety of assessment techniques, such as self-assessment, portfolios, and so on, to evaluate students' performance in favor of cultural diversity.	0%	40%	0%	30%	30%	3.50	1.28	Suitably prepared
6	I am able to design assessments to complement the culturally responsive pedagogical strategies	50%	40%	0%	10%	0%	1.70	0.90	Unprepared



	Items	Strongly Disagree	Disagree	Not Decided	Agree	Strongly Agree	Mean	SD	Interpretation
	that were employed during instruction.								
7	I am able to evaluate culturally diverse students' readiness, intellectual and academic strengths and weaknesses, and development needs.	25%	40%	15%	20%	0%	2.30	1.05	Unprepared
8	I am able to utilize a variety of instructional methods to match students' learning preferences in learning the subject matter and maintaining their attention and interest in learning.	10%	40%	20%	22%	8%	2.78	1.14	Suitably prepared
Average		15.63 %	36.25 %	11.25 %	21.50 %	15.38 %	2.85	1.34	Suitably prepared
Factor 2: Relationship and Expectation Establishment									
	Items	Strongly Disagree	Disagree	Not Decided	Agree	Strongly Agree	Mean	SD	Interpretation
9	I am able to know how	10%	40%	30%	20%	0%	2.60	0.92	Suitably prepared



	Items	Strongly Disagree	Disagree	Not Decided	Agree	Strongly Agree	Mean	SD	Interpretation
	to communicate with culturally diverse students and their parents or guardians.								
10	I am able to structure classroom-based meetings that are comfortable for parents.	25%	25%	0%	25%	25%	3.00	1.58	Suitably prepared
11	I am able to foster meaningful and supportive relationships with parents and families, and actively involve them in their students' learning.	0%	30%	10%	40%	20%	3.50	1.12	Suitably prepared
12	I am able to use non-traditional discourse styles with culturally diverse students in an attempt to communicate in culturally	20%	25%	0%	30%	25%	3.15	1.53	Suitably prepared



	Items	Strongly Disagree	Disagree	Not Decided	Agree	Strongly Agree	Mean	SD	Interpretation
	responsive ways.								
13	I am able to communicate expectations of success to culturally diverse students.	35%	45%	0%	5%	5%	1.89	1.05	Unprepared
14	I am able to establish expectations for appropriate classroom behaviour in considering students' cultural backgrounds to maintain a conducive learning environment.	20%	20%	0%	43%	17%	3.17	1.44	Suitably prepared
Average		18.33%	30.83%	6.67%	27.17%	15.33%	2.90	1.40	Suitably prepared
Factor 3: Group belonging formation									
	Items	Strongly Disagree	Disagree	Not Decided	Agree	Strongly Agree	Mean	SD	Interpretation
15	I am able to develop and maintain positive, meaningful, caring, and trusting relationships	10%	10%	10%	50%	20%	3.60	1.20	Suitably prepared



	Items	Strongly Disagree	Disagree	Not Decided	Agree	Strongly Agree	Mean	SD	Interpretation
	ps with students.								
16	I am able to create a warm, supporting, safe, and secure classroom environment for culturally diverse students.	30%	5%	0%	40%	25%	3.25	1.61	Suitably prepared
17	I am able to create a community of learners by encouraging students to focus on collective work, responsibility, and cooperation.	10%	40%	0%	20%	30%	3.20	1.47	Suitably prepared
18	I am able to provide students with knowledge and skills needed to function in mainstream culture.	0%	40%	10%	25%	25%	3.35	1.24	Suitably prepared
	Average	12.50 %	23.75 %	5.00 %	33.75 %	25.00 %	3.35	1.40	Suitably prepared

NOTE

1.00-2.33=Unprepared

2.34-3.66=Suitably prepared



3.67-5.00=Fully prepared

The mean value of each item (item 1 to 8) in the first factor, *curriculum and instruction*, ranged from 1.70 to 3.95. The mean values of second factor (item 9 to 14), *relationship and expectation establishment*, ranged from 1.89 to 3.50. In the third factor (item 15 to 18), *group belonging formation*, the highest factor loading is 3.60, and the lowest 3.20. In sum, the mean values of competencies in the whole survey ranged from 1.70 to 3.60. The results indicated that the scores of culturally responsive teacher preparedness scale perceived by preservice teachers in terms of three factors for CRTPS: curriculum and instruction (Average Mean=2.85), relationship and expectation establishment (Average Mean=2.90), and group belonging formation (Average Mean=3.35). The items (3,6,7 and 13) shows that the teachers are unprepared for these factors. They might not have skills in developing a collection of instructional examples that are culturally familiar to students to serve as a scaffold for learning, designing assessments using culturally responsive pedagogical strategies, evaluating the students' readiness, intellectual and academic strengths and to communicate expectations of success to culturally diverse students.

4. Discussion

The purpose of this study was to investigate the preparedness of culturally responsive teachers in the context of Myanmar. Results from analysis supported three subscales of culturally responsive teaching literature. Results are consistent with culturally responsive teaching literature. Because advocates approach culturally responsive teaching competencies from different directions or interpretations, it is difficult to compare them with or integrate them into factors identified in this study on the basis of a one-to-one comparison. The first factor of the scale, curriculum and instruction, combine two factors, curriculum and instruction and student assessment, which are advocated by Siwatu (2006). It is well known that before, during, and after teaching, student assessment is important for modifying, adapting, improving and designing curriculum and instruction. Before teaching, teachers need to know culturally diverse students' readiness, intellectual and academic strengths and weaknesses, and development needs; during teaching, teachers need to design assessments to complement the culturally responsive pedagogical strategies that were employed; and after teaching, teachers need to use a variety of assessment techniques to evaluate students' performance in support of cultural diversity. In terms of curriculum-, EFL teachers need to review and assess curricula and instructional materials to determine their multicultural strengths and weakness and the relevance to students' interest and instructional needs, revise them if necessary, and infuse them with the culture of students represented in the classroom. For instruction, teachers need to utilize a variety of instructional methods, develop a collection of instructional examples, and find ways to support language acquisition to match students' learning preferences in learning the subject matter, and maintaining their attention and interest in learning. According to the data, this factor has shown the highest mean value of EFL teachers' preparedness for culturally responsive teaching. This factor includes the areas discussed by Hollins (1993):



(a) knowing the subject and students, (b) engaging in reflective teaching, (c) identifying resources, and (d) promoting learners' performance. The factors of designing culturally relevant curricula and establishing cultural harmony /congruity in classroom instruction (Gay 2002b) are also included. The second factor of relationship and expectation

establishment in this study is mainly focused on communication with parents or families so as to foster their involvement in students' learning and expectations of success for students. Therefore, communicating with parents, structuring meetings that make parents feel comfortable, fostering supportive relationships with parents and families, and establishing expectations for students to maintain a conducive learning environment are important competencies to recognize preservice teachers' preparedness for culturally responsive teaching. This factor is extracted from the classroom management factor of four-factor model. However, it is more clearly to indicate that for culturally responsive teaching, the relationship and expectation establishment through communication with parents and students plays a major role for classroom management in culturally responsive teaching. One of Hollins' (1993) major competencies, developing interpersonal relationships, also includes this important factor. The third factor of group belonging formation is important for culturally responsive teaching because it emphasizes on creating a warm, supporting, safe, and secure classroom to maintain positive, meaningful, caring, and trusting relationships with culturally diverse students, as well as providing knowledge and skills for students to function in mainstream culture focusing on collective work, responsibility, and cooperation. This again echoes the work of Hollins' (1993) creating a supportive context, Gay's (2002b) cultural caring for students and building a learning community, and Siwatu's (2006) classroom management and cultural enrichment. Another scholar, Cohen, M.S. (2013) characterize 21st century culturally responsive teaching and his data indicate the need for teachers to acquire knowledge, skills, and desire to (a) design culturally relevant curricula, (b) withhold racializing students' identities, (c) be cognizant of overgeneralizing and (d) use technology in culturally responsive teaching. Williams, L. (2019) found that teachers who create an inclusive environment that nurtures a feeling of community/ family of shared experiences and traditions with their students, promote the historical and language culture of their students, create relevant and relatable lessons, and makes meaningful connections with their students through the building of relationship, may actually aid in closing the Black-White academic gap.

5. Limitations

There are several limitations to this study. Samples used in this study were recruited from teachers at selected universities; this may restrict the generalization of the results to teachers cultivated in other universities. This needs to be further examined. In addition, this study used exploratory factor analysis; the future study is needed to use confirmatory factor analysis for further investigation. The other limitation to this study is that the scores of CRTPS



perceived by teachers may not reflect their real ability to implement culturally responsive teaching or to teach culturally and linguistically diverse students. Because this scale used self-report method to investigate how teachers thought they were prepared in culturally responsive teaching, it was possible that the participants could perceive their competencies with social desirability rather than with their real ability. Additional evidence for teachers' preparedness of culturally responsive teaching from other sources is needed, such as, observations, structured interviews, or diary methods. Finally, the competency preparedness for culturally responsive teaching analyzed in this study was based on the general competencies of culturally responsive teaching. That is, competency preparedness for specific subject matter (e.g., language, literature, skills) is not specified in this study. Teachers have higher scores in this scale may not be good at teaching certain subject matters. More specific competencies about subject matters for evaluating teacher preparedness for classroom teaching are needed.

6. Conclusions

The CRTPS was applied in this study to evaluate the teachers' preparedness to teach in a diverse classroom. The three-factor scale revealed in this study: (a) curriculum and instruction, (b) relationship and expectation establishment, and (c) group belonging formation, provides a starting point for teacher preparation programs to understand their students' preparedness for working with diverse students. In addition, since the population of culturally and linguistically diverse students continues to increase, there is a definite need for developing the competence of culturally responsive teachers. The factors identified in the present study can be used for teacher education programs to prepare future teachers. Teacher education students may use these competencies as a guide to elect courses related to culturally responsive teaching. Also, the factors and competencies can provide current teachers a roadmap to use as they work with students from diverse group in education. Furthermore, researchers can use these three factors as a competency framework to discuss the characteristics of culturally responsive teaching and thus develop a more comprehensive and detailed system for culturally responsive teaching.

7. Recommendation

Language teaching will not be effective if the teachers themselves are not ready for culturally responsive teaching classroom. Thus, the teachers should join the professional development by experts and specialists. It is expected that professional development program will assist the teachers to be culturally responsive ones. The researches on culturally responsive teaching pedagogies will be carried out as an implementation in order to be a culturally responsive teaching classroom.

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Prose Fiction Analysis and Literary Appreciation of English Specialization Students in Myanmar

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Abstract

The use of literature in language teaching gives many contributions to increase students' achievement such as creative thinking, motivation, and enjoyment. One of the genres of literature that is taught in language teaching is prose. Comprehension of prose provides several educational benefits to the students. This quantitative and qualitative study explores the effects of integrating literary appreciation and language teaching in English language classes on 126 undergraduate English specialization students in Myanmar. The objectives of the study are (a) to investigate the students' opinions in relation to the effective way of understanding the basic elements of prose fiction, (b) to identify how the students learn in relation to the literary aspects and writing aspects and (c) to evaluate why the students analyze fiction in the form of essay. The instruments used to gather information were student questionnaire and selected students interview survey. Content analysis and document analysis were mainly used to analyze data taken from the students at the end of the semester. Results revealed that literary appreciation activities were beneficial for both language learning and literary appreciation, and essay writing was found to be useful for student understanding of the elements of prose and their ability to read and write. The findings suggest that with careful selection and planning, literary study can be integrated into language teaching in a meaningful and effective way.

Keywords: Prose Fiction Analysis, Literary Appreciation, English Specialization Students, Myanmar

1. Introduction

The present study examines the effects of prose in foreign language teaching and learning at the University level. It is based on a systematic review of the literature, identifying key pros and cons of using prose in the classroom. The research then discusses the implications of the findings for foreign language teachers, learners and future research. Moreover, this study also examines the role of literature in language teaching and the importance of literary analysis in EFL education. It discusses the advantages of teaching literature and the benefits of



literary analysis for EFL students. Collie & Slater (1987) highlighted the need for teachers to be well-prepared in order to successfully teach literature and how activities involving reading and analyzing literature can motivate students to become more active readers. Prose fiction is a type of literature that contains stories about characters, settings, and situations. It is typically composed in the form of a narrative and can be found in books, magazines, and online.

In addition, literature is considered appropriate for teaching a language since it has always been seen as authentic materials (Collie & Slater, 1987). It is authentic because the creation of literary work was not intended specifically for language teaching. Moreover, the language used in the text is genuine and is intended for the native speaker of the target language (Collie & Slater, 1987). Therefore, literature offers many benefits for language learners if it is used for learning a language.

Firstly, literature offers cultural knowledge of the people written in the story (Lazar, 1993). Literature may act as the representation of the reality in the form of fiction. It reflects not only the life in the real world, but also the culture of the society as presented in the text.

Secondly, literature also provide language enrichment for the learners (Floris, 2004). Learners would have many linguistics inputs in terms of vocabulary, grammatical structure, and style. The language used in the literature mostly is not a type of language commonly used in daily communication and textbooks. Thus, if literature is used for teaching a language, learners would learn the lexical and syntactical items in its context.

And thirdly, the use of literature generates personal involvement (Floris, 2004). If the learners are personally involved with the texts they read, their attention would be shifted from the mechanical aspect of the language to the engagement of the story barely aware that they learn the language. When they are drawn to the development of the story, the learners could feel the personal attachment with particular characters they read and might share every emotion the characters think and feel.

Prose fiction can be used to teach integrated skills such as, problem-solving, critical thinking, and communication. For example, students can be asked to read a passage from a novel and then answer questions related to it. This can help them develop their critical thinking and problem-solving skills as they analyze the passage and consider the various aspects of it (Erkaya, 2005). Additionally, reading prose fiction can help students develop their communication skills, as they learn how to effectively express their opinions and ideas. Furthermore, by exploring the themes of the story, students can gain a deeper understanding of the characters and the situations they face. The teaching of prose is closely associated with the teaching of reading as the main goal is similar, that is comprehension. The use of literature in language classes began in the early 19th century when Britain and its colonies used literature to teach languages (Hall, 2005).

The techniques of teaching reading such as skimming, scanning, and silent reading can be applied to comprehend prose material (Aslam, 2006). He further states that since the goal of teaching prose is very close to the goal of teaching reading, the kind of activity involved is usually answering the comprehension questions in the end of the passage. In relation to the teaching and learning of



prose fiction in university level, it is very common for the instructors to present a set of comprehension questions to the students to be answered either in groups or individually, and either answered orally or in written form.

It has also been argued that the goal of literary education is to motivate and teach the students to become active readers who will keep educating themselves on literature and language (Mattila et al. 2008). In literature, the basic purpose of prose in writing is to convey an idea, deliver information, or tell a story. Prose is the way a writer fulfills his/her basic promise to a reader to deliver a story with characters, setting, conflict, a plot, and a final pay-off. In the past, the inclusion of literature in language teaching has not attracted many attentions from researchers and practitioners. Among the genres of literary text, prose fiction is a type of literary genre which is mostly available in any means of communication.

With the advancement of technology, one can find fiction easily from internet. Various genres are downloadable from the internet, ranging from novels, short stories, mini fiction, and micro fiction, either classic or modern. In recent decades, the use of prose fiction in language class is not something new. Many practitioners have exploited the use of prose fiction for teaching language skills, such as for transmitting wisdoms, understandings, and entertainments (Ahmad, 2012), for teaching reading (Ahmad, 2012), (Khatib & Nasrollahi, 2012) and (Can, 2014), for teaching writing (Sukmawan, Setyowati & Nurmansyah, 2015) and (Setyowati, 2016), for listening and reading skills (Rodriguez & Leonor, 2017) and for teaching writing (Setyowati & Sukmawan, 2018).

Isariyawat, Yenphech & Intanoo (2020) argued that literature and literary texts can be used to promote cultural awareness as they provide students with a rich source of knowledge about different cultures and their beliefs, values, and traditions. They also highlighted the potential of literature and literary texts to help students develop their language skills, such as reading comprehension, critical thinking, and writing. Additionally, the authors suggested that incorporating literature and literary texts into the curriculum can help students gain a deeper understanding of the world and its diversity.

The essay can provide a close reading of the text and analyze its structure, themes, and symbols in order to draw out its deeper meaning. To do this, the essay should focus on a single aspect of the work, such as the protagonist's journey, the setting, or a particular motif. Moreover, the essay should explain why this particular aspect is important to the work's overall meaning, and how it reflects the author's values, beliefs, and intentions. It should also present evidence from the text to support its claims. Finally, the essay should offer insights or conclusions based on the analysis.

1.1 Aspects of an Essay

To create a good essay, there are some aspects of writing that need to be considered. As stated by Harvey (2009), there are twelve aspects of an academic essay. The first is the occurrence of a thesis. This thesis explains about the topic being discussed. Secondly, it is the motives. The motive should be clear and genuine and is usually placed in the introduction of the essay. Thirdly, it is the key terms. The key terms help the readers to see the important points of the essay. The fourth is the evidence. The evidence is the data that can be used to support the



thesis. The data can be in the form of facts, examples, and details. The fifth is the analysis. To analyze is not to quote or to summarize, but to do something with the data. Harvey (2009) states that logical thinking is the key aspect of analysis whether the reasoning is done implicitly or explicitly. The sixth is the structure.

The essay structure deals with the logical order, whether the essay is ordered by using order of importance, sequence order, or complexity order. Seventh, it is stitching. The word stitching means connecting sentences and paragraphs by using transitions words to shape an intact, united, and coherent essay. The eighth is sources. When writing academic writing it is important to have sources to back up the thesis and the argument. Ninth is reflecting. Reflecting means the writer's own reflection through the consideration of counterargument. Next is orienting. Orienting is giving some information that might be needed by the readers to understand the whole text. The eleventh element is stance. Stance is the writer's attitude which can be shown by tone and dictions. And the final element is style. Style is the choice of words, sentence, and structure. Style is what every piece of writing unique

1.2 Teaching Prose Fiction

The idea of using literature, especially prose fiction, in language classes has given birth to the models of how to apply them in the classroom. Scholars proposes some models for using literature in language classes. Lazar (1993) classifies the approach that can be used for applying literature in language teaching, namely language-base model, the content-based model, and personal enrichment model. The language-based model integrates the literature syllabus and linguistic components such as the use of grammar, diction, and discourse to describe the aesthetic side of the works.

Meanwhile, the content-based model focuses on the analysis of literature in terms of the historical and cultural background, the genre, and the rhetorical devices. The personal enrichment model, on the other hand, emphasizes the self-reflection toward the works that is by relating the text with the learners' personal experiences, opinions, and feeling. Similarly, Bottino (1999) proposes three models for teaching languages by using literature, namely the cultural model, the language model, and the personal growth model. The cultural model focuses on the transmission of culture, feelings, ideas, and the target language learnt. Whereas the language model focus on the use of literature as a means of learning vocabulary and structures to create literary meanings.

The last model as proposed by Bottino (1999) is the personal growth model which puts emphasize on the personal involvement of the learners to read for enjoyment as well as to read for interpretation. Looking at the models proposed by Lazar (1993) and Bottino (1999) a similarity between the models can be drawn. They are on the agreement that literature can be used to teach language components, such as vocabulary and grammar, as well as to enhance learners personal experience and enrichments. Lazar's (1993) content-based model seems to be similar to Bottino's (1999) cultural model since the purpose of this model is alike.



However, Lazar (1993) suggests prior applying any of the models, the learners' need should be identified so that an appropriate model can be chosen for them aside from the models of teaching literature as discussed above, there are some strategies specifically addressed to the teaching of prose fiction. According to Morris (2015), there are four effective strategies for teaching prose, namely read, write, discuss, and integrate technology. Since teaching prose means teaching reading with comprehension, the instructors usually ask about the intrinsic elements of the story. As students gain more maturity with their reading comprehension, the comprehension questions usually get heavier, such as the writer's purpose, the message, themes, and connecting the story with personal life experiences. Morris (2015) further states that the interpretation of prose can be done orally, or in written form through filling out graphic organizer, charts, or other outlining techniques.

1.3 Research Questions

This study was carried out in order to answer the following questions:

- 1) What are the students' opinions in relation to the effective way of understanding the basic elements of prose fiction?
- 2) How do the students learn in relation to the literary aspects and writing aspects?
- 3) Why do the students analyze fiction in the form of essay?

1.4 Research Objectives

The research questions can be answered via the following three research objectives:

- 1) To investigate the students' opinions in relation to the effective way of understanding the basic elements of prose fiction
- 2) To identify how the students learn in relation to the literary aspects and writing aspects
- 3) To evaluate why the students analyze fiction in the form of essay

2. Methodology

This research employed a mixed method. The instruments used to gather information were student questionnaire and selected students interview survey. A questionnaire with predominantly closed ended questions was used to collect quantitative data. SPSS version 22 was used to analyze quantitative data. This data was then statistically sorted into percentage, mean and standard deviation. The average mean of the factors with five-rating Likert's scale are employed to analyze the data. The data collection was conducted in selected universities in Myanmar. The survey was conducted in 2022 academic year for the topic.

Interviews were conducted with each participant face-to-face. Content analysis and document analysis were also used to analyze the data. The participants of the study were 126 undergraduate English specialization students who took prose as their core module in selected universities of Myanmar. The data were taken from the students at the end of the semester after they joined prose module class. Thus, the instrument used in the study was mainly documentation.



In the study, the students were asked to write their opinion in short paragraph describing their views and feeling in relation to the use of essay for analyzing fiction. During the teaching and learning process, the students were asked by their lecturer to analyze short fiction they read in the form of at least four paragraph essay which consists of introduction, body, and conclusion. In the end of the semester, the students were asked to describe their feelings and opinion in relation to the teaching learning process, especially in the use of essay to analyze fiction in the forms of self-reflection writing. Before writing their opinion, the lecturers wrote the items the students need to explore, namely, the effective way of understanding the basic elements, the use of essay for prose analysis, and what they learn from prose fiction analysis.

The data of the study in the form of words and sentences were analyzed qualitatively. To help the researchers analyzed the data, codifications were used. The codification system consists of the student's name, aspects, and students' identity number. After the data were collected, the researchers omitted data which were not relevant with the purpose of the study. The data were reduced and classified based on the following criteria: the effective way of understanding basic elements of prose fiction, their opinion of analyzing fiction in the form of essay, and what the students learn in relation to the literary aspects and writing aspects.

3. Findings

In this research, writing strategy has been applied to analyze the fiction in the class being studied. For one semester, the students were asked to analyze a prose fiction individually in the form of an essay. Since most of prose fiction teaching and learning processes use comprehension questions at the end of the passage, it is very unusual to find a prose class that asks students to analyze a prose fiction in the form of an essay, especially in Myanmar context. The essay should be written in the accepted form and follow the general convention of essay writing, namely the occurrence of introductory paragraph, thesis statement, development of ideas in the body of essay, and conclusion. Thus, the present study is considered worth doing because of several reasons.

Firstly, previous research mainly focuses on the methodology of teaching prose (Setyaningsih, 2014; Novianti, 2016) and did not really explore the students' views in relation to their learning of prose. Secondly, the strategies for teaching prose found in the previous research focus mainly on the utilization of comprehension questions in the end of the text, while in this present research, the students' comprehension was checked through their ability to analyze the fiction in the form of an essay. And thirdly, having the information in relation to the students' view and feelings about their analysis of prose fiction in the form of an essay can help the lecturers to have insights and ideas of teaching innovation either in using prose fiction for teaching writing or teaching essay writing by using prose. Therefore, the present study is intended to fill the gap and to enrich the body of knowledge in relation to the teaching of prose fiction in EFL context and essay writing. The effective way of understanding the basic elements of fiction was explored in phase 1.

3.1 Phase 1: The Effective way of Understanding the Elements of Fiction



Research Question (i): What are the EFL learners' opinions in relation to the effective way of understanding the basic elements of prose fiction?

Table 1
Ways to understand the basic elements (N=126)

S N	Ways to understand the basic elements of Fiction	Responses%					Calculation		Interpretation
		Never	Rarely	Sometimes	Often	Always	Mean	SD	
1	Analyzing it in the form of essay	2.40	7.90	27.00	46.80	15.90	3.66	0.92	Very positively effective
2	Responding questions myself	0.80	13.50	51.60	25.40	8.70	3.28	0.83	Positively effective
3	Reading the prose and then writing the summary	11.10	26.20	39.70	16.70	6.30	2.81	1.04	Positively effective
Average		4.8	15.9	39.4	29.6	10.3	3.25	1.00	Positively effective

NOTE:

1.00-1.80=Slightly effective

1.81-2.60=Moderately effective

2.61-3.40=Positively effective

3.41-4.20=Very positively effective

4.21-5.00=Completely effective

In their self-reflection writing, the students wrote three ways for understanding the intrinsic elements of prose fiction, namely analyzing it in the form of essay, responding questions and reading the prose and then writing the summary. The students wrote in their self-reflection writing that making essay for analyzing prose fiction is the effective way for understanding the basic elements of the prose (Mean= 3.25). The students give various reasons about the benefits of understanding prose fiction through essay writing in phase 2.

3.2 Phase 2: Analyzing Fictions in the Form of Essay

Research Question (ii): What are the EFL learners' considerations regarding the benefits of analyzing fiction in the form of essay?

Table 2
Benefits of analyzing fictions in the form of essay (N=126)



SN	Benefits	Responses%					Calculation		Interpretation
		Never	Rarely	Sometimes	Often	Always	Mean	SD	
1	Sharpen my ability to read and write	0	3.20	23.00	30.20	43.60	4.14	0.88	Very positively effective
2	Increase my critical thinking	0	3.20	20.60	33.30	42.90	4.16	0.86	Very positively effective
3	Enhance my ability to express ideas in the form of essay	0	6.30	27.80	35.70	30.20	3.90	0.91	Very positively effective
4	Able to analyze the basic elements better	0.80	8.70	49.20	29.40	11.90	3.43	0.84	Very positively effective
5	Improve my vocabulary	0	3.20	11.90	26.20	58.70	4.40	0.82	Completely effective
Average		0.2	4.9	26.5	31.0	37.5	4.01	0.92	Very positively effective

NOTE:

- 1.00-1.80=Slightly effective
- 1.81-2.60=Moderately effective
- 2.61-3.40=Positively effective
- 3.41-4.20=Very positively effective
- 4.21-5.00=Completely effective

Table 3 shows that more than half percent of the students believe that analyzing fiction in the form of an essay helps them to sharpen their ability to read and write (Mean=4.14). Some of them think that it helps them to learn to write in terms of expressing ideas (Mean=3.90) and increase their critical thinking ability (Mean=4.16).

Although very few of the students think that analyzing fiction enable them to understand better about the basic elements of prose (Mean=3.43) and improve the vocabulary (Mean=4.40), undeniably, this type of activity helps the students a lot for their reading ability. Phase 3 reflects analyzing prose fiction in the form of literary aspects and writing aspects.

3.3 Phase 3: Reflection of Writing that Analyze Prose Fiction in the Form of Literary Aspects and Writing Aspects

Research Question (iii): What are the EFL learners' reflection in relation to the literary aspects and writing aspects?



The study was classified into two categories in terms of what they learn during a semester activity of analyzing fiction by writing them down in the form of essays. Those two categories are what they learn in terms of literary aspects, and what they learn in terms of writing aspects.

3.3.1 Literary Aspects

Most of the students' writing reflect that analyzing prose fiction in the form of an essay, helps them to understand the basic elements of a story, namely characterization, plot, setting, point of view and theme.

Table 3
Literary Aspects (N=126)

SN	Literary Aspects	Responses%					Calculation		Interpretation
		Never	Rarely	Sometimes	Often	Always	Mean	SD	
1	Basic Elements of the story	0.80	10.30	48.40	23.80	16.70	3.45	0.91	In practice, it is often helpful
2	Content of the story	0	5.80	19.80	34.80	39.60	4.08	0.91	In practice, it is always completely helpful
3	Moral Value	1.60	7.10	20.70	34.90	35.70	3.96	1.00	In practice, it is always completely helpful
Average		0.8	7.7	29.6	31.2	30.7	3.83	0.98	In practice, it is always completely helpful

NOTE:

1.00-2.33=In practice, it is sometimes helpful

2.34-3.66=In practice, it is often helpful

3.67-5.00=In practice, it is always completely helpful

In terms of the literary aspects, the students consider that analyzing fiction in the form of an essay is always completely helpful for them in practice. By rewriting, they improve the skills of writing and reading. Writing the basic element of prose in the form of essay make the students understand the content and able to learn moral value from the prose.

3.3.2 Writing Aspects

Based on the data of the students' self-reflection essay, there are several writing aspects that the students wrote. The writing aspects are giving details and evidences based on the fiction they read, how to open an essay, and how to make thesis statement for the essay.



Table 4
Writing Aspects (N=126)

SN	Writing Aspects	Responses%					Calculation		Interpretation
		Never	Rarely	Sometimes	Often	Always	Mean	SD	
1	Giving details, examples, and evidences related to the main idea	0	4.80	48.40	30.20	16.60	3.59	0.82	In practice, it is often helpful
2	Writing introductory paragraph for an essay	0.80	4.80	29.40	38.90	26.10	3.85	0.89	In practice, it is always completely helpful
3	Making thesis statement for an essay	3.20	11.90	51.60	22.20	11.10	3.26	0.92	In practice, it is often helpful
Average		1.3	7.2	43.1	30.4	17.9	3.56	0.91	In practice, it is often helpful

NOTE:

1.00-2.33=In practice, it is sometimes helpful

2.34-3.66=In practice, it is often helpful

3.67-5.00=In practice, it is always completely helpful

In terms of the writing aspects, the students consider that analyzing fiction in the form of an essay enable them to learn how to give examples and details to support their argument (Mean=3.59). They also think that they learn how to open an essay (Mean=3.85), while the rest of them state that they learn how to make thesis statement for an essay (Mean=3.26).

3.4 Student Interview (n=10)

In order to obtain students' opinion concerning the use of prose, each participant was interviewed to confirm the findings obtained from the student's questionnaire. Content analysis of responses revealed that the use of prose acted as a useful vehicle to sharpen the ability to read and write, increase critical thinking, enhance the ability to express ideas in the form of essay, able to analyze the basic elements better and improve vocabulary effectively and meaningfully. Below are students' response excerpts: (slightly edited for grammatical correctness)

Student 1: In my opinion, writing to learn strategy extends thinking and sharpen understanding because I continuously engage with the text to infer meaning.



Analyzing a fiction in the form of an essay helps me critical thinking ability and express ideas in written.

Student 2: I think reading-to write is a model of integrating reading and writing course puts great emphasize on student-centered learning atmosphere and authentic learning environment through making use of information resources, not only to construct meaning but also critical thinking. In this activity, I have freedom to select topics and materials of my interest to support the ideas for my writing.

Student 3: In the prose fiction analysis, I was assigned by the teacher to analyze a particular story, then put my analysis into an essay. To write the essay, sometimes, I need additional information from other sources to strengthen my opinion.

Student 4: There are several benefits of analyzing a prose fiction in the form of an essay. By using the reading-to write model or writing to learn strategy or writing for comprehension, I get new vocabulary from the stories I read.

Student 5: When I read the texts, in this case, the fiction, I give my best effort to understand the content of the story.

Student 6: One of the challenges in comprehending literary texts as authentic materials is the vocabulary. If one or two important vocabularies are not understood, the students would not be able to understand the point of the story.

Student 7: Reading, undoubtedly, offers me valuable input for the target language. Mostly only by reading language, I may acquire linguistic input, especially in vocabulary and spelling.

Student 8: To be able to make an analysis in the form of an essay, I need to read critically, then to write critically. So, analyzing prose fiction in the form of an essay can sharpen critical thinking ability.

Student 9: In my opinion, critical thinking is a thinking skill to analyze and evaluate something which is self-directed, self-monitored, and self-disciplined. One way to promote the critical thinking skill is through writing.

Student 10: The class being studied in this research applied the 'write' strategy to analyze the fiction. Since most of prose fiction teaching and learning processes use comprehension questions at the end of the passage, it is very unusual to find a prose class that asks students to analyze a prose fiction in the form of an essay, especially in Myanmar context.

4. Discussion

This research article aimed to explore the role of prose fiction in language teaching, and the findings suggest that prose fiction can be used in language teaching to encourage student engagement, create meaningful learning experiences, and foster cognitive development. It is found that using literary genre to teach language can help English as a Second Language/English as a Foreign



Language students improve their linguistic proficiency and reading/writing skills. The use of reading-to-write models, writing to learn strategies, and writing for comprehension was found to be effective. Results from document analysis showed that students gained new vocabulary from stories they read. Additionally, the theory of second language acquisition suggests that comprehensible input is necessary for language learners to acquire a new language, which can be achieved through comprehending literary texts.

Regarding objective 1, the students agree that the best way to understand the basic elements of prose fiction is to read them critically. Students should read multiple works of fiction, paying close attention to the author's techniques and analyzing the characters, plot, themes, setting, and other elements. Additionally, they should discuss their opinions and interpretations of the work with other students, and discuss the work in class. This will help them to gain a better understanding of the elements of prose fiction and how they interact with one another to create a cohesive story. Responding to questions is a great way to understand the basic elements of prose fiction. It allows students to think more critically about the text, ask questions about characterization, plot, setting, and more. It also encourages students to engage with the text in a more meaningful way, which can help them better comprehend the story.

According to the self-reflection writing of the students, responding questions is the best way to learn and understand the basic elements of the prose fiction. Another way for understanding the basic elements of prose fiction is to read the prose and then writing the summary. The students wrote in their self-reflection writing that this way of understanding the basic elements of prose fiction is very helpful and effective.

The findings are similar to notable researchers such as Ghasemic (2011), Alkhaleefah (2017), Bist (2018) and Isarigawat, Yenpheck & Intanoo (2020) who reported that literature provides rich linguistic input and effective stimuli for students to express themselves, and a potential source of learner motivation. The texts also provide an opportunity for multi-sensorial classroom experiences and can appeal to learners with different learning style. The students can promote their creativity and language proficiency in ESL/EFL context of ELT classroom. Therefore, it is essential to design the literary texts in ELT course to promote both the language skills (i.e., listening, speaking, reading, and writing) and language areas (i.e., vocabulary, grammar, and pronunciations).

Regarding objective 2, the students consider that analyzing the fiction in the form of an essay can acquire the knowledge about the different types of writing styles. They can analyze the figures of speech, tone, and other literary aspects of the prose. This helps them to understand the different types of writing styles and their impacts. Furthermore, they can also learn the techniques of how to write an essay effectively. They can try different techniques to give the essay an effective shape. At the same time, the students also think that analyzing fiction in the form of an essay helps them to enhance their critical and analytical skills. They can analyze the characters, plot, symbolism, and other elements of the literature and form an opinion on it. This helps them to develop their analytical and critical thinking skills which are important for their future academic life. In short, analyzing fiction in the form of an essay is beneficial for the students in many ways.



It helps them to improve their writing and reading skills, enhance their critical and analytical thinking skills and learn the different types of writing styles. Therefore, it is important for the students to analyze the fiction in the form of an essay.

In relation to writing aspect, they agree that they can learn how to end an essay. In terms of organization and structure, the students state that they can learn how to introduce an essay. They also think that they learn how to develop the body of the essay. Furthermore, they agree that they can learn how to create a logical flow of ideas. In addition, they think that they can learn how to use citations and references properly. Lastly, they believe that they can learn how to proofread and edit the essay.

The present research findings confirm the findings of Osman (2018) who acknowledges that using literature in language teaching is very beneficial as it motivated students, enhanced critical thinking skills and led to developing linguistic knowledge and cultural awareness. It can also be used as a way to engage students in meaningful dialogue and to promote critical thinking.

Regarding objective 3, the students analyze fiction in the form of essay because the essay helps the students to increase their understanding and knowledge of literature. Moreover, essay writing also helps students to develop critical thinking skills. By writing an essay, students can evaluate and analyze the ideas of the author and can form their own conclusion. This helps them to understand the logic of the author and also helps them to think critically and objectively. Furthermore, essays also help students to practice their writing skills. By writing essays, students can improve their writing skills and become more efficient in their work. This helps them to improve their writing style, grammar and vocabulary. Overall, analyzing fiction in the form of an essay is an effective way of developing critical thinking and writing skills. It helps students to understand the moral values of the prose in a better way and also helps them to improve their writing skills.

The results are consistent with Ghasemi (2011) in which she claimed that the literature can give a lot of benefits to ELT learners such as language enrichment, culture enrichment and authentic materials. The teaching of literature can also improve learners' critical thinking skills as stories can be used to explore students' viewpoints or perspectives; thus, encouraging them to voice their opinions and to build up their self-confidence. Besides this, critical thinking can promote tolerance; this can be done through dialogical critical thinking activities.

This research demonstrates the potential benefits of using prose fiction as a tool to develop language learners' reading, critical thinking, and writing skills. By analyzing the fiction, language learners are exposed to unfamiliar vocabulary, and gain valuable input in the target language. Through the practice of critical reading, they sharpen their critical thinking skills, and learn to think and write critically. Finally, they are able to write in accordance to the accepted conventions.

This research article has explored the implications of reading and prose in language classrooms. It is suggested that literary texts, especially fiction, should be used in the classroom as they can trigger critical thinking, enable students to understand themselves and others, and to learn about cultures. It is also suggested that the strategy of teaching and learning of prose should consider the use of the



strategy to write for comprehension. Finally, writing instructors should utilize literary texts as the teaching materials, as they are rich in values and content that can be applied to learning to write or writing to learn.

5. Conclusion

This research has shown that the use of literary genre to teach language skills and language fields can be beneficial for ESL/EFL learners. Through reading and discussing prose fiction, language learners can increase their understanding of the language and gain a deeper appreciation for the various literary works available. They can also improve their overall language ability and develop a greater understanding of the culture and context of the language. By providing students with an engaging context in which to practice their skills, prose fiction can help students become better language learners and writers. By providing students with an engaging context in which to practice their skills, prose fiction can help language learners improve their comprehension, analysis, and writing ability.

Prose fiction, when analyzed as an essay, can sharpen students' critical thinking skills, teach them about language and culture, and provide them with valuable input for their language learning. The data collected through document analysis and self-reflection from students suggests that prose fiction can be effectively utilized to improve language proficiency, reading/writing skills, and even critical thinking ability. Moreover, the findings also suggest that reading fiction can help language learners develop their writing skills by providing them with a richer source of ideas and themes to draw from when creating their own writing. Overall, this research suggests that using prose fiction as a tool to develop language learners' reading, critical thinking, and writing skills can be beneficial.

6. Recommendations

This study indicates the benefits of utilizing literary texts to promote reading, writing, and comprehension. It also supports the use of writing for learning and writing for comprehension, which are both strategies that can be used to engage students in the reading and writing of literary texts. By utilizing these strategies, lecturers can foster a better understanding of the texts and help students to gain a deeper understanding of the themes and ideas within the texts. The study also suggests that by using literary texts, lecturers can foster a more meaningful learning experience for their students. The implications of this study are addressed to the reading of prose and writing to the lecturers by suggesting the use of literary texts in the language classroom and the use of writing to learn/writing for comprehension strategies. Future research should investigate the effectiveness of essay writing to improve comprehension in comparison to other methods, and explore which writing aspects are affected by the use of prose fiction.



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High School Students' Attitudes toward Chemistry

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Abstract

Many Myanmar students have a hard time with the Chemistry course because it is often one of the first classes they take after middle school which demand higher level study skills. Developing positive attitudes toward and interest in science in general and learning science in particular is one of the key goals for teaching and learning the sciences. Thus, over the years, this area fuelled many research studies, these being focused on: content, pedagogical, and curricular issues. In this paper we focused on the issue of enhancing attitude and interests in the context of chemistry learning mainly at the upper secondary level of schooling. Many studies have been conducted on student attitudes toward learning science in general; however, studies concerning attitudes toward Chemistry are limited in number. The purpose of this research was to explore the Myanmar high school students' attitudes toward Chemistry by using the shortened version of Bauer's semantic differential, ASCIv2 (Attitude toward the Subject of Chemistry Inventory version 2), developed and validated by Xu and Lewis in 2011. Following the procedures, the inventory was administered to a total of 101 high school students of 10th and 11th grade at a public high school in Myanmar. Factor analysis was conducted to analyse the intellectual and emotional attitudes of the participants. According to descriptive analyses, the mean values suggested that the Myanmar students in the sample had average intellectual and emotional attitudes. The findings also demonstrated that former success in chemistry courses as well as achievement in middle school had effects on high school students' intellectual and emotional attitudes toward chemistry.

Keywords: High school students, Attitudes, Chemistry

1. Introduction

Many researchers have produced a comprehensive synthetic description of research articles published between years 2000 and 2012 on interest, motivation and attitude of K-12 students towards science and technology. In this attitude, to explore possible shifts in attitudes towards and aspirations in science over the primary secondary school divide, a large-sample study in England was conducted with students in their last year in primary school and then again with the same cohort of students in their second year in secondary school (DeWitt et al., 2014). This trend raises issues about how science and technology is taught in schools, suggesting that there may be a gap between what a school focuses on and what students prefer. In this attitude, to explore possible shifts in attitudes towards and aspirations in science over the primary secondary school divide, a large-sample study in England was conducted with students in their last year in primary school and then again with the same cohort of students in their second year in secondary



school (DeWitt et al., 2014). Findings from this research support Potvin and Hasni's observation to a certain degree in that students progressing to secondary school continue to hold low aspirations in science. Yet, this research reports that students' attitudes toward science remain positive in secondary school. It is well recognized in the literature that affective components such as interest, attitude, and motivation play an important role in students' decisions of whether or not to engage in science. Research has also established that certain affective variables are influential in students' developing conceptual understanding over time (Nieswandt, 2007), and that affect plays a role even after controlling for cognition (Lewis et al., 2009). Therefore, aims of science education are concerned not only with students' cognition but also with students' "affect," a key term usually used as a synonym to "emotions" (Reiss, 2005). Science educators consider interest, motivation, attitudes, beliefs, self-confidence and self-efficacy as constructs of the affective domain (Alsop, 2003). Of these, attitudes toward science have been the particular focus of research in science education concerning affect (Alsop, 2005). Based on earlier work of educational theorists, Nieswandt (2005) defines attitude as a predisposition to respond positively or negatively to things, people, places or ideas. As such, attitudes of students toward science involve students' predispositions to respond to science and scientists based on the views and images they develop as a result of relevant experiences (Ramsden, 1998).

1.1 Student Attitudes toward Chemistry

Numerous studies have been conducted on student attitudes toward learning science in general; however, there are a limited number of studies focusing on attitudes toward chemistry. Among pioneering research in the topic is the study conducted by Hofstein et al. (1977) with high-school students (ages 15–18). A study conducted more recently with high-school students (ages 16–19) in Hong Kong revealed that students were only marginally positive about chemistry lessons (Cheung, 2009). Research conducted in Greece examined Greek high school students' (ages 16–17) attitudes toward the difficulty, the interest, the usefulness of chemistry courses, and the importance of chemistry in the students' life (Salta and Tzougraki, 2004). The findings suggested that students had neutral attitudes regarding the difficulty of and interest in chemistry courses, that they did not find chemistry as useful for their future career but recognized its importance in everyday life. Lang et al. (2005), in their study about gifted and non-gifted high school students' (average age of 15–16 years) attitudes toward chemistry in Singapore, reported associations between open-ended chemistry laboratory environments, dynamic teacher–student interactions, and enhanced student attitudes toward chemistry, especially for the gifted groups. A limited number of experimental studies also report the effect of interventions on students' chemistry attitudes. In their study with first-year college students, Brandriet et al. (2011) suggested that there was a statistically significant attitude change after a one-semester inquiry-based learning pedagogy implemented in general chemistry courses, and that this change was in favour of low-achieving students. The researchers also found that, in general, females had less favourable attitudes towards chemistry than males.



1.2 Assessment of Chemistry Attitudes

Concerned with student misunderstandings, or ideas that do not support well with commonly accepted scientific understandings, diagnostic assessment has been often attributed to the cognitive domain. However, Brandriet et al. (2011) argue that attitudinal assessments can also be valuable in the diagnostic sense. There exists a wide range of attitudinal assessment measures toward science in general. Most commonly, science attitudes are measured through questionnaires consisting of Likert-scale items that require students to respond based on five options such as strongly agree/agree/not sure/disagree/strongly disagree (Osborne et al., 2003). Given the limited number of studies that focus on student attitudes toward chemistry, in particular, the measures specific to chemistry attitudes are also scarce. The Attitude Toward Chemistry Lessons Scale (ATCLS) developed by Cheung (2007) in Chinese is a Likert-scale measure consisting of seven-point 12 items.

A less-widely used format known as semantic differential in attitude research requires respondents to express their attitude relative to two opposite adjectives. In general, this format of assessment includes fewer items and requires shorter time to respond as compared to a typical Likert-scale measurement. Among researchers, there are different views about the appropriateness of attitude measures. Some find that Likert scales produce the highest reliability among other formats (Simpson & Oliver, 1990), and others suggest that a semantic differential format may effectively reduce acquiescence bias when measuring positive psychological constructs (Friborg et al., 2006). Brandriet et al. (2011) argue that it is important to use instruments that avoid redundancy and assessment fatigue to obtain quality data. Furthermore, it could especially become critical to use shorter assessments with high school students who may experience fatigue in reading and responding to long questionnaire items more often than adults. As long as the measurements are reliable and valid, shorter instruments could also be useful in terms of being administered in a minimal amount of time. In 2011, the ASCI was refined by Xu and Lewis by reducing the number of items and conducting reliability and validity work. The revised version of the ASCI is referred to as ASCIv2 (Attitude toward the Subject of Chemistry Inventory version 2) and includes eight adjective pairs.

1.3 Purpose of Research

The present study is concerned with high school students' attitudes toward chemistry. Given the value of using shorter measures at the high school level requiring minimal administration time and avoiding assessment fatigue, the ASCIv2 instrument was considered to be an appropriate tool to accomplish the research purposes. Bauer (2008) also indicates that the vocabulary and the reading level of the instrument may be appropriate for upper secondary level students. The ASCIv2 is composed of polar adjectives, and it is thought that the adjectives could be understandable by a high school age population. The goals of this research study were (1) to examine high school students' attitudes toward chemistry and (2) to investigate their intellectual accessibility and emotional satisfaction toward chemistry.



2. Methods

Students are asked to indicate whether they think chemistry is easy (position 1), hard (position 7), or somewhere in between. The adjectives and the position choices are placed on the same line, with some of the positive adjectives on the left side and some on the right side. This, according to Bauer (2008), reduces the risk of falling into a pattern of acquiescence. In the directions section above the items, students are asked to express their attitudes toward chemistry as a body of knowledge and not their feelings about their chemistry teachers or chemistry courses. To adapt the instrument to Myanmar context, translation of the adjective pairs was undertaken by language teaching experts who were fluent in both English and Myanmar languages. A total of three Myanmar language teaching experts and four English language teaching experts, who were all faculty members, worked to translate the adjectives to best match their meaning in the Myanmar language. Two of the English language teaching experts were also experienced in attitude research.

2.1 The Instrument

The ASCIv2 includes eight items that consist of pairs of polar adjectives on a seven-point semantic differential scale.

Table 1: Attitude toward chemistry

1. Chemistry is easy 1 2 3 4 5 6 7 hard.
2. Chemistry is complicated 1 2 3 4 5 6 7 simple.
3. Chemistry is confusing 1 2 3 4 5 6 7 clear.
4. Chemistry is comfortable 1 2 3 4 5 6 7 uncomfortable.
5. Chemistry is satisfying 1 2 3 4 5 6 7 frustrating.
6. Chemistry is challenging 1 2 3 4 5 6 7 not challenging.
7. Chemistry is pleasant 1 2 3 4 5 6 7 unpleasant.
8. Chemistry is chaotic 1 2 3 4 5 6 7 organised.

Table 1

Items under the factor's Intellectual accessibility and Emotional satisfaction of the original ASCIv2

Intellectual accessibility	Emotional satisfaction
Hard–easy	Uncomfortable–comfortable
Complicated–simple	Frustrating satisfying
Confusing–clear	Unpleasant–pleasant
Challenging–unchallenging	Chaotic organized

2.2 Data Collection

Prior to the study being conducted, all documentation required by the school was submitted and permission was obtained to collect data in the high school. A consent form was prepared in which the students were informed about the



purpose of the research and the procedure to be followed to fill in responses. The consent form included a statement that participation was voluntary and that the students were not going to be asked for any personally identifiable information. The researcher's contact information was provided in case a question or problem arose. With the help of teachers, the inventory was given to intact classes in paper-and-pencil format during the academic year of 2023. Students who volunteered to participate completed the survey in approximately 3 minutes by placing their responses on the sheet.

All students in the sample of grades 10 and 11 had a chemistry course in the previous year. Within the context of traditionally highly centralized education system, schools follow the same curricula, specific to each grade and each subject area. Thus, chemistry course in the sample school is based upon the same content within particular grades (e.g., grade 10 Chemistry). Furthermore, teachers and students are provided with textbooks approved by the Ministry of Education for use in each grade and subject area. The same scoring system is used in all schools. The students in this study were not asked to provide their personal information, so the possibility of students' motivation to present themselves favourably to their teachers or the researcher is removed from consideration.

3. Results

Collected **data were** initially entered in Excel spreadsheet, and then transferred to SPSS 17.0 data editor for data analysis. Based on this model, items 1, 4, 5, and 7 comprised the positive statements and items 2, 3, 6, and 8 comprised the negative statements subscale.

3.3.1 Phase 1: Grade 10

Table 1
Positive statements (Grade 10, n=47)

Sr No	Statement	Choice							Calculation		Interpretation
		1	2	3	4	5	6	7	Mean	SD	
1	Chemistry is easy 1 2 3 4 5 6 7 hard.	12.77 %	6.38 %	21.28 %	44.68 %	12.77 %	2.13 %	0.00 %	3.45	1.23	Moderate
4	Chemistry is comfortable 1 2 3 4 5 6 7 uncomfortable.	4.26 %	17.02 %	14.89 %	46.81 %	10.64 %	4.26 %	2.13 %	3.64	1.24	Moderate
5	Chemistry is satisfying 1	6.38 %	17.02 %	19.15 %	48.94 %	6.38 %	2.13 %	0.00 %	3.38	1.10	Moderate



Sr No	Statement	Choice							Calculation		Interpretation
		1	2	3	4	5	6	7	Mean	SD	
	2 3 4 5 6 7 frustrating.										
7	Chemistry is pleasant 1 2 3 4 5 6 7 unpleasant	6.38 %	25.53 %	8.51 %	42.55 %	8.51 %	0.00 %	8.51 %	3.5 5	1.5 3	Moderate
Average		7.45 %	16.49 %	15.96 %	45.74 %	9.57 %	2.13 %	2.66 %	3.5 1	1.2 9	Moderate

NOTE:

1.00-3.00=Easy

3.01-5.00=Moderate

5.01-7.00=Hard

Descriptive statistics results based on the mean values of the items with the highest factors are presented in Table 1. The higher scores represent positive aspects of student attitudes. The mean values given in Table 1 indicate that the students had moderate attitudes (Average Mean=3.51) toward chemistry.

Table 2

Negative statements (Grade 10, n=47)

Sr No	Statement	Choice							Calculation		Interpretation
		1	2	3	4	5	6	7	Mean	SD	
2	Chemistry is complicated 1 2 3 4 5 6 7 simple.	0.00 %	19.1 5%	17.0 2%	27.6 6%	23.4 0%	8.51 %	4.26 %	3.9 8	1.3 8	Difficult
3	Chemistry is confusing 1 2 3 4 5 6 7 clear.	0.00 %	6.38 %	8.51 %	48.9 4%	19.1 5%	12.7 7%	4.26 %	4.3 6	1.1 4	Difficult



S r N o	State ment	Choice							Calculati on		Interpreta tion
		1	2	3	4	5	6	7	Me an	SD	
6	Chemist ry is challeng ing 1 2 3 4 5 6 7 not challeng ing.	10.6 4%	17.0 2%	29.7 9%	29.7 9%	6.38 %	4.26 %	2.13 %	3.2 6	1.3 4	Difficult
8	Chemist ry is chaotic 1 2 3 4 5 6 7 organise d.	2.13 %	2.13 %	21.2 8%	48.9 4%	12.7 7%	10.6 4%	2.13 %	4.0 9	1.1 1	Difficult
Average		3.19 %	11.1 7%	19.1 5%	38.8 3%	15.4 3%	9.04 %	3.19 %	3.9 2	1.3 1	Difficult

NOTE:

1.00-3.00=Complicated

3.01-5.00=Difficult

5.01-7.00=Simple

Descriptive statistics results based on the mean values of the items with the highest factors are presented in Table 2. The higher scores represent negative aspects of student attitudes. The mean values given in Table 2 indicate that the students faced difficulties in learning chemistry (Average Mean=3.92).

Table 3

Intellectual accessibility (Grade 10, n=47)

S r N o	State ment	Choice							Calculati on		Interpreta tion
		1	2	3	4	5	6	7	Me an	SD	
1	Chemist ry is easy 1 2	12.7 6%	6.38 %	21.2 8%	44.6 8%	12.7 7%	2.13 %	0.00 %	3.4 5	1.2 3	Not easily accessible



S r N o	State ment	Choice							Calculati on		Interpreta tion	
		1	2	3	4	5	6	7	Me an	SD		
	3 4 5 6 7 hard.											
2	Chemist ry is complic ated 1 2 3 4 5 6 7 simple.	0.00 %	19.1 5%	17.0 2%	27.6 6%	23.4 0%	8.51 %	4.26 %	3.9 8	1.3 8	Not easily accessible	
3	Chemist ry is confusin g 1 2 3 4 5 6 7 clear.	0.00 %	6.37 %	8.51 %	48.9 4%	19.1 5%	12.7 7%	4.26 %	4.3 6	1.1 4	Not easily accessible	
6	Chemist ry is challeng ing 1 2 3 4 5 6 7 not challeng ing.	10.6 3%	17.0 2%	29.7 9%	29.7 9%	6.38 %	4.26 %	2.13 %	3.2 6	1.3 4	Not easily accessible	
8	Chemist ry is chaotic 1 2 3 4 5 6 7 organise d.	2.11 %	2.13 %	21.2 8%	48.9 4%	12.7 7%	10.6 4%	2.13 %	4.0 9	1.1 1	Not easily accessible	
Average		5.10 %	10.2 1%	19.5 8%	40.0 0%	14.8 9%	7.66 %	2.56 %	3.8 3	1.3 1	Not easily accessible	

NOTE:

1.00-3.00=Accessible to everyone

3.01-5.00=Not easily accessible

5.01-7.00=Accessible only with great difficulty or not at all

Based on this model, items 1, 2, 3, 6, and 8 comprised the “intellectual accessibility” subscale. Descriptive statistics results based on the mean values of the items are presented in Table 3. The higher scores represent the aspects of student intellectual accessibility. The mean values given in Table 3 indicate that the students were not easily accessible (Average Mean=3.83) toward chemistry.



Table 4
Emotional satisfaction (Grade 10, n=47)

S r N o	Statement	Choice							Calculati on		Interpret ation
		1	2	3	4	5	6	7	Me an	SD	
4	Chemistry is comfortable 1 2 3 4 5 6 7 uncomfortable.	4.25 %	17.0 2%	14.8 9%	46.8 1%	10.6 4%	4.26 %	2.13 %	3.6 4	1.2 5	Feel satisfactio n
5	Chemistry is satisfying 1 2 3 4 5 6 7 frustrating .	6.38 %	17.0 2%	19.1 5%	48.9 4%	6.38 %	2.13 %	0.00 %	3.3 8	1.1 0	Feel satisfactio n
7	Chemistry is pleasant 1 2 3 4 5 6 7 unpleasant.	6.39 %	25.5 3%	8.51 %	42.5 5%	8.51 %	0.00 %	8.51 %	3.5 5	1.5 3	Feel satisfactio n
Average		5.67 %	19.8 6%	14.1 8%	46.1 0%	8.51 %	2.13 %	3.55 %	3.5 2	1.3 1	Feel satisfactio n

NOTE:

1.00-3.00=Feel a sense of dissatisfaction

3.01-5.00=Feel satisfaction

5.01-7.00=Get great satisfaction

Based on this model, items 4, 5, and 7 comprised the “emotional satisfaction” subscale. Descriptive statistics results based on the mean values of the items are presented in Table 4. The higher scores represent the aspects of student emotional satisfaction. The mean values given in Table 4 indicate that the students feel satisfaction (Average Mean= 3.52) toward chemistry.

3.3.1 Phase 1: Grade 11

Table 5

Positive statements (Grade 11, n=54)



S r N o	Statement	Choice							Calculati on		Interpret ation
		1	2	3	4	5	6	7	Me an	SD	
1	Chemistry is easy 1 2 3 4 5 6 7 hard.	0.00 %	14.8 1%	20.3 7%	25.9 3%	22.2 2%	11.1 1%	5.56 %	4.1 1	1.4 0	Moderate
4	Chemistry is comfortable 1 2 3 4 5 6 7 uncomfortable.	7.41 %	7.41 %	31.4 8%	31.4 8%	16.6 7%	5.56 %	0.00 %	3.5 9	1.2 3	Moderate
5	Chemistry is satisfying 1 2 3 4 5 6 7 frustrating.	9.26 %	16.6 7%	14.8 1%	25.9 3%	16.6 7%	14.8 1%	1.85 %	3.7 6	1.5 9	Moderate
7	Chemistry is pleasant 1 2 3 4 5 6 7 unpleasant.	7.41 %	20.3 7%	29.6 3%	24.0 7%	9.26 %	7.41 %	1.85 %	3.3 7	1.3 9	Moderate
Average		6.02 %	14.8 1%	24.0 7%	26.8 5%	16.2 0%	9.72 %	2.31 %	3.7 1	1.4 3	Moderate

NOTE:

1.00-3.00=Easy

3.01-5.00=Moderate

5.01-7.00=Hard

Descriptive statistics results based on the mean values of the items with the highest factors are presented in Table 5. The higher scores represent positive aspects of student attitudes. The mean values given in Table 5 indicate that the students had moderate attitudes (Average Mean=3.71) toward chemistry.

*Table 6**Negative statements (Grade 11, n=54)*



S r N o	State ment	Choice							Calculati on		Interpret ation
		1	2	3	4	5	6	7	Me an	SD	
2	Chemist ry is complic ated 1 2 3 4 5 6 7 simple.	1.85 %	18.5 2%	38.8 9%	24.0 7%	9.26 %	5.56 %	1.85 %	3.4 4	1.2 1	Difficult
3	Chemist ry is confusin g 1 2 3 4 5 6 7 clear.	3.70 %	11.1 1%	29.6 3%	24.0 7%	22.2 2%	7.41 %	1.85 %	3.8 0	1.3 1	Difficult
6	Chemist ry is challeng ing 1 2 3 4 5 6 7 not challeng ing.	27.7 8%	22.2 2%	18.5 2%	12.9 6%	7.41 %	11.1 1%	0.00 %	2.8 3	1.6 5	Difficult
8	Chemist ry is chaotic 1 2 3 4 5 6 7 organise d.	0.00 %	7.41 %	20.3 7%	29.6 3%	22.2 2%	1.85 %	18.5 2%	4.4 6	1.5 0	Difficult
Average		8.33 %	14.8 1%	26.8 5%	22.6 9%	15.2 8%	6.48 %	5.56 %	3.6 3	1.5 5	Difficult

NOTE:

1.00-3.00=Complicated

3.01-5.00=Difficult

5.01-7.00=Simple

Descriptive statistics results based on the mean values of the items with the highest factors are presented in Table 6. The higher scores represent negative aspects of student attitudes. The mean values given in Table 6 indicate that the students faced difficulties in learning chemistry (Average Mean=3.63).

Table 7

Intellectual accessibility (Grade 11, n=54)



S r N o	State me nt	Choice							Calculati on		Interpret ation
		1	2	3	4	5	6	7	Me an	SD	
1	Chemist ry is easy 1 2 3 4 5 6 7 hard.	0.00 %	14.8 1%	20.3 7%	25.9 3%	22.2 2%	11.1 1%	5.56 %	4.1 1	1.4 0	Not easily accessible
2	Chemist ry is complic ated 1 2 3 4 5 6 7 simple.	1.85 %	18.5 2%	38.8 9%	24.0 7%	9.26 %	5.56 %	1.85 %	3.4 4	1.2 1	Not easily accessible
3	Chemist ry is confusin g 1 2 3 4 5 6 7 clear.	3.70 %	11.1 2%	29.6 3%	24.0 7%	22.2 2%	7.41 %	1.85 %	3.8 0	1.3 1	Not easily accessible
6	Chemist ry is challeng ing 1 2 3 4 5 6 7 not challeng ing.	27.7 8%	22.2 2%	18.5 2%	12.9 6%	7.41 %	11.1 1%	0.00 %	2.8 3	1.6 5	Accessibl e to everyone
8	Chemist ry is chaotic 1 2 3 4 5 6 7 organise d.	0.00 %	7.41 %	20.3 7%	29.6 3%	22.2 2%	1.85 %	18.5 2%	4.4 6	1.5 0	Not easily accessible
Average		6.67 %	14.8 2%	25.5 6%	23.3 3%	16.6 7%	7.41 %	5.56 %	3.7 3	1.5 3	Not easily accessible

NOTE:

1.00-3.00=Accessible to everyone

3.01-5.00=Not easily accessible

5.01-7.00=Accessible only with great difficulty or not at all



Based on this model, items 1, 2, 3, 6, and 8 comprised the “intellectual accessibility” subscale. Descriptive statistics results based on the mean values of the items are presented in Table 7. The higher scores represent the aspects of student intellectual accessibility. The mean values given in Table 7 indicate that the students were not easily accessible (Average Mean=3.73) toward chemistry.

Table 8
Emotional satisfaction (Grade 11, n=54)

S r N o	Statement	Choice							Calculati on		Interpret ation
		1	2	3	4	5	6	7	Me an	SD	
4	Chemistry is comfortable 1 2 3 4 5 6 7 uncomfortable.	7.41 %	7.40 %	31.4 8%	31.4 8%	16.6 7%	5.56 %	0.00 %	3.5 9	1.2 3	Feel satisfactio n
5	Chemistry is satisfying 1 2 3 4 5 6 7 frustrating .	9.26 %	16.6 7%	14.8 1%	25.9 3%	16.6 7%	14.8 1%	1.85 %	3.7 6	1.5 9	Feel satisfactio n
7	Chemistry is unpleasant 1 2 3 4 5 6 7 pleasant.	7.41 %	20.3 7%	29.6 3%	24.0 7%	9.26 %	7.41 %	1.85 %	3.3 7	1.3 9	Feel satisfactio n
Average		8.03 %	14.8 1%	25.3 1%	27.1 6%	14.2 0%	9.26 %	1.23 %	3.5 7	1.4 2	Feel satisfactio n

NOTE:

1.00-3.00=Feel a sense of dissatisfaction

3.01-5.00=Feel satisfaction

5.01-7.00=Get great satisfaction

Based on this model, items 4, 5, and 7 comprised the “emotional satisfaction” subscale. Descriptive statistics results based on the mean values of the items are presented in Table 8. The higher scores represent the aspects of student emotional



satisfaction. The mean values given in Table 8 indicate that the students feel satisfaction (Average Mean= 3.57) toward chemistry.

4. Discussion

In this study, students are asked to indicate whether they think chemistry is easy (position 1), hard (position 7), or somewhere in between. Students are asked to express their attitudes toward chemistry as a body of knowledge and not their feelings about their chemistry teachers or chemistry courses. Including instructions, the survey form was given its final shape based on the physical design features suggested by Bauer (2008). In high schools, students decide to pursue science mathematics or non-science-mathematics tracks upon completion of Grade 9. Thus, high school students in Grades 10 and 11 who had decided for science-mathematics tracks were included in the study. Based on this model, items 1, 2, 3, 6, and 8 comprised the “intellectual accessibility” subscale, and items 4, 5, and 7 comprised the “emotional satisfaction” subscale. Descriptive statistics results based on the mean values of the items with the highest means are presented. The mean values indicate that the students had neither positive nor negative attitudes toward chemistry. However, intellectual attitudes did not differ significantly between students (Mean= 3.83 in Grade 10 and 3.73 in Grade 11). Similarly, no significant differences were observed among the students’ emotional attitudes (Mean=3.52 in Grade 10 and 3.57 in Grade 11). Comparisons of the different grade levels did not yield any significant differences in terms of emotional satisfaction means.

5. Conclusion

In response to the first research objective, the shortened version of Bauer’s semantic differential, ASCIv2, was adapted for use in a different context and high school student population, unlike previous work that targeted college student populations. Though adapted to a different context and language, factor analysis results showed the students’ attitudes toward chemistry. The mean values found in this study indicating average attitudes toward chemistry. On the other hand, the results indicate neither negative nor positive attitudes. The results are consistent with those of Salta and Tzougraki (2004), indicating that Greek students in Grade 11 consider chemistry neither difficult nor easy and demonstrate neutral interest attitudes. As an expected result, students thought that chemistry was not easily accessible. A limitation of the current study is that reported results are based on data collected from a convenient sample of high school students. These conclusions need to be verified with a representative sample in further research. Students feel about intellectual accessibility of chemistry in a similar way to their higher achieving counterparts. On the other hand, emotional satisfaction increased with increasing as might be expected. Although these results are significant both in a statistical and practical sense, small effect sizes of students are a limitation of this study. Methods such as convenient sampling and the use of ordinal data may have contributed to this effect. While this research does not reveal a cause-effect relationship, it provides evidence that chemistry course



achievement and both intellectual and emotional attitudes are interrelated for high school students. Based on this relationship, it is possible to say that achievement would enhance a positive attitude toward chemistry, and a positive attitude would bring about higher levels of success. In this sense, further experimental research which investigates the effect of attitudes on achievement may prove useful in better understanding this relationship. According to the findings of this research, it is important that aims of teaching chemistry, as well as other subjects, are concerned not only with students' cognition but also with students' affect. Curriculum development and teaching practices that are sensibly tailored to enhancing students' attitudes may serve as catalysts for future success. Efforts to enhance affect may also help to reverse the alerting trend of the low attention paid by students to enrolling in science.

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The Assessment Literacy of English Teachers Working at the Universities in Myanmar

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Abstract

Assessment literacy refers to the knowledge, skills, and process associated with designing, selecting, implementing, scoring, and/or using high-quality assessments to improve student learning. Assessment is considered to be a critical component in the process of teaching and learning as it enables teachers to evaluate student learning and utilize the information to improve learning and instruction. One of the most important aspects in the quality assurance of language testing and assessment (LTA) is the assessment literacy of teachers. Foreign language teachers particularly have to deal with their own classroom-based assessment as well as standardized language tests. The present study aims to explore the assessment literacy of English teachers working at the universities in Myanmar. Data collected by means of an online LTA questionnaire and focus group interviews revealed crucial findings about the areas the EFL teachers received pre- or in-service training in the LTA domain, their perceived needs for an in-service training in this field as well as their attitudes towards the testing/assessment practices in language preparatory programs.

Keywords: Assessment Literacy, Teachers' Perceived Needs, Myanmar EFL.

1. Introduction

Assessment literacy is an understanding and practicing of the principles of sound assessment and it is the teacher's capacity to examine student performance evidence and distinguish quality work through the analysis of achievement scores. A teacher, administrator, policymaker, or student and their family can use assessment to enhance student learning and accomplishment if they possess the assessment literacy set of beliefs, knowledge, and practices. It is considered to be a critical component in the process of teaching and learning as it enables teachers to evaluate student learning and utilize the information to increase learning through changing and improving their instructional practices. In Myanmar HEIs, the method used for assessment is in Traditional classroom assessment which involves various activities, such as constructing paper pencil tests and performance measures, grading, interpreting, and using them in making educational decisions. In 1993, Plake pointed that teachers in a number of studies are observed to spend up to 50% of their time on assessment related activities;



therefore, they need to develop assessment literacy to spend this time effectively and practice the relevant knowledge and skill regularly in their classrooms. Stiggins, 1997 expressed that educational reforms have heralded new classroom assessment approaches that go beyond traditional paper and pencil techniques to include alternative performance assessment methods. Such alternative assessments focus more on motivating students to take more responsibility for their own learning and intend to make assessment an integral part of the learning experience and to stimulate student abilities to create and apply a wide range of knowledge rather than simply engaging in acts of memorization. Gronlund, 1998 pointed that there is one reason to acquire the assessment that teachers gather information about the students' progress and try to understand to what extent instructional methods used achieve the intended teaching and learning outcomes. Brookhart, 1999 also points out that good classroom assessment enables teachers to draw accurate inferences about individual student achievement and communicate that information to students and parents. At the same year 1999, Mertler conducted a study which revealed that teachers tended to develop assessment skills on the jobs as opposed to structured environments such as courses or workshops. According to Huba and Freed (2000) assessment is a process of gathering and discussing information from various sources to develop a deep understanding of what students know, understand, and can do with their knowledge because of educational experiences. Whatever tests and performance measures they use, teachers should be aware of the strengths and weaknesses of each and choose appropriate formats to assess different achievement targets which should match with course objectives and instruction. They should be able to share the grading criteria with the students and interpret test scores appropriately and use assessment results to make decisions about students' educational issues. Teachers who have a solid background in assessment are "not intimidated by the sometimes mysterious and always daunting technical world of assessment" (Stiggins, 2002, 240), and are able to integrate assessment with instruction. Teachers are more and more expected to incorporate various assessment practices as overreliance on one assessment method makes it virtually impossible for teachers to adapt teaching and learning to meet individual student needs. Hargreaves showed that with increasing interest in testing and assessment, expectations regarding teachers' classroom practices have undergone a paradigm shift. Thus, Chen, 2003 stated that assessment can be described as any technique, tool, or strategy that teachers use to elicit evidence of students' progress toward the stated goals. In all these visions the common point is that teachers must recognize different purposes of assessment and use them accordingly as Green & Mantz, 2002 mentioned. However, despite the increasing need for teacher assessment literacy, research indicates limited pre-service assessment education and a lack of research on the pedagogies that support teachers' assessment practices found in Galluzzo's research on 2005. In one research where 69 teacher candidates participated in all four years of their concurrent programs within a large Canadian urban setting, Volante and Fazio 2007 found that most candidates favoured only summative assessment and lacked other forms of assessment knowledge, and their levels of self-efficacy regarding assessment remained relatively low across each of the four years of program. In 2013, Pellegrino pointed



out that a poorly performed assessment would inhibit effective teaching and learning, and this would be influenced by the teachers' knowledge of assessment. To improve their assessment literacy, teacher candidates overwhelmingly endorsed the development of specific courses focusing on classroom assessment. Massey et al., 2020 indicate that in-service and preservice teachers perceive assessment mainly as summative tests and grading. Cañadas, 2021 expressed that this product-oriented approach should be enhanced to include learning processes, i.e., the formative approach needs to be promoted. These two functions do not exclude each other; assessment literate teachers recognize them both."

1.1 Language Testing and Assessment

Language testing is a broad category of testing that assesses aspects of a person's ability to understand or communicate in a particular language. It is used for a variety of purposes. In academic settings, language testing can assess a student's current abilities or progress for the purposes of academic placement. In professional settings, language testing can determine whether a candidate has the language skills needed for a job. Thus, Assessment responsibilities of language teachers increase accordingly. Depending on the context, language teachers are asked to organize and administer classroom language assessment activities themselves and to deal with local as well as external testing procedures and policies. However, despite the importance given on a global scale, language teachers' testing and assessment literacy (LTA) has been highly questioned. Gardner and Rea-Dickins, 2001 found that many English language teachers had a limited set of language testing terms.

1.2 The Aim of the Present Study

The aim of their study was to explore foreign language teachers' testing and assessment literacy across by focusing on the training needs of foreign language teachers, their current background in the different areas of LTA, and the extent to which they had received training in testing and assessment domains during their pre- and in-service education. The data obtained from the questionnaires and interviews revealed that despite the small difference across countries, only certain domains of teachers' LTA literacy was developed. In light of these observations, to address the gaps in previous research, the present study aims to gather in-depth information about the LTA literacy of ELT teachers at tertiary level and in line with this purpose, the following research questions were addressed in this study:

- a. In what areas do the EFL teachers receive training in the LTA domains?
- b. What are the EFL teachers' perceived needs for training in the LTA domains?
- c. What are the attitudes of the EFL teachers about the LTA practices at the language programs?

2. Method

The research methods are known as the tactics, procedures, or techniques used in the gathering of data or evidence for analysis in order to unearth new knowledge or develop a better grasp of a topic. In this study, a mixed- method is used, quantitative and qualitative.

2.1. Research Design

The present study employs mixed method as a research design (Onwuegbuzie & Johnson, 2004) that combines quantitative and qualitative research techniques into a single study. The quantitative data was collected by



means of an online LTA questionnaire adapted from Vogt and Tzagari (2014) to find out the training practices and needs of EFL teachers and qualitative came from focus group interviews carried out with three group of volunteers participating teachers. Overall, the rationale behind choosing a mixed-method design in this study was to provide an in-depth analysis on (a) the level of competency toward received training in LTA, (b) the need for training in LTA domains and (c) the testing practices of EFL teachers.

2.2 Participants

This study was conducted with EFL teachers working at the language preparatory programs offered by universities. The primary aim of these programs is to enhance students' four language skills, grammar, and vocabulary before they start their undergraduate studies at different disciplines. The participants of this study were 19 EFL teachers (3 males and 16 females) with age ranging from 32 to 59 years old. All participants had their majors in English Language Teaching (ELT) with at least 5 years of teaching experience.

2.3. Data Collection Instruments

The online questionnaire used in the present study was adapted from Vogt and Tzagari's, 2014 study which aimed to find out the classroom-oriented LTA practices and needs of FL teachers from Myanmar Higher Education Institutions was used as a starting point. One particular item related to the 'awarding final certificates' was excluded from the questionnaire as this it was not applicable to the LTA practices in EFL context. The questionnaire consisted of two major parts. The first part (Part 1) had two sub-parts: a) teachers' classroom-focused LTA practices, and (b) purposes of testing. In all these three sub-parts, the respondents were asked in what assessment and training domains they received training and in which of those domains they need further training. The questionnaire was based on a 3-point Likert-type scale ranging from "not at all" (1) to "more advanced" (3). As for the second part of the questionnaire (Part 2), 3 open-ended questions were included with at attempt to get insight about the attitudes of the participating teachers about the LTA practices at language preparatory programs. Before the questionnaire was administered to the participants, it was piloted with 6 English teachers. The reliability estimates ranged from .73 to .87 indicating a high level of internal consistency (Gliem, & Gliem, 2003). After piloting the questionnaire, it was sent to 25 EFL teachers online via Email and Facebook, among 25 teachers, 19 of the participating teachers responded back to the questionnaire. Furthermore, to complement the quantitative data, focus group interviews were carried out with 19 EFL teachers enrolled in language preparatory programs to gather in-depth information about the perceptions and needs of the participants about LTA domains as well as identify their LTA classroom practices. The purpose of using this particular type of interview was to generate data based on the synergy of the group interaction as proved by Green et al., 2003. During the interview, the participating teachers were asked whether they had received any training on testing and to what extent they could apply what they had learned in their LTA practices. They were also asked about the types of



testing and assessment used in their institution along with their roles in the LTA domains and their attitudes of the participants about the LTA practices.

2.4. Data Analysis

In this study, data collected from the online questionnaire were entered into and analysed statistically via SPSS (version 20.0). Mean and Standard Deviation were estimated to analyse and report the gathered data. The focus group interviews were analysed through pattern coding in order to complement the qualitative findings. The process began with the open coding of the data followed by inducing categories from these codes.

3. Findings

3.1. The Perceptions of the EFL Teachers about the Received Inservice Training in the LTA Domains

In the following section, the findings of the first research question regarding the perceptions of the EFL teachers about the received in-service training in the LTA domains as well as the sufficiency of this training are reported using Mean (M) and Standard Deviation (SD). Specifically, the questionnaire results were reported under three LTA domains: (a) classroom-focused LTA and (b) purposes of testing.

Table 1

Areas EFL teachers receive training in the LTA domains (n=19)

The areas Myanmar EFL teachers receive training in the LTA domains are illustrated in the following table.

Sr No.	Areas	Not at all	A little	Advanced	Mean	SD	Interpretation
1.	Preparing classroom tests	15.80%	42.10%	42.10%	2.26	0.71	Satisfactory
2.	Using ready-made tests from textbooks packages or from other sources.	0.00%	89.50%	10.50%	2.11	0.31	Satisfactory
3.	Giving feedbacks to students based on information from tests/ assessment	0.00%	47.40%	52.60%	2.53	0.50	Very satisfactory
4.	Using self or peer-assessment	0.00%	68.40%	31.60%	2.32	0.46	Satisfactory
Average		3.94%	61.92%	34.20%	2.31	0.50	Satisfactory

NOTE:



1.00-1.66=Not satisfactory
 1.67-2.33=Satisfactory
 2.34-3.00=Very satisfactory

According to the responses of the participants, item 3 has been found as the highest Mean Value. The participants are very satisfactory in giving feedbacks to students based on information from tests/ assessment. (M= 2.53). Item 4 possesses the second highest Mean value, it means that they use self or peer-assessment. Item 1 “preparing classroom tests” is the third highest Mean value, the teachers are satisfied with preparing the classroom tests.

Table 2
EFL teachers’ perceived needs for training in the LTA domains (n=19)

Table 2 shows EFL teachers’ perceived needs for training in the LTA domains.

Sr No.	Training Needed	None	Yes, basic training	Yes, advanced training	Mean	SD	Interpretation
1.	Preparing classroom tests	0.00%	47.40%	52.60%	2.53	0.50	Fully needed
2.	Using ready-made tests from textbooks packages or from other sources	0.00%	57.90%	42.10%	2.42	0.49	Fully needed
3.	Giving feedbacks to students based on information from tests/ assessment	0.00%	47.40%	52.60%	2.53	0.50	Fully needed
4.	Using self or peer-assessment	0.00%	57.90%	42.10%	2.42	0.49	Fully needed
Average		0.00%	52.65%	47.35%	2.48	0.50	Fully needed

NOTE:
 1.00-1.66=No need
 1.67-2.33=Still needed
 2.34-3.00=Fully needed

In table 2, it has been found out that teachers express a fully need for basic or more advanced training in almost all areas covered in the questionnaire. The respondents reported that they need basic training (47.40 %) and more advanced training (52.60 %) in “preparing classroom tests” and “Giving feedbacks to students based on information from tests/ assessment” (M=2.53). Similarly, item



in 2 “using ready-made tests from textbooks packages or from other sources” “and 4 “using self or peer-assessment” (M= 2.42), the teachers need both basic training (57.90%) and advanced training (42.10%). This showed that they wished for advanced training in these areas.

Table 3

Respondents’ Perceptions of Training Received in Purpose of Testing (n=19)

Table 3 represents respondents’ perceptions of training received in Purpose of Testing.

Sr No.	Items	Not at all	A little (1-2 days)	Advanced	Mean	SD	Interpretation
1.	Giving grades	10.50%	73.70%	15.80%	2.05	0.51	Satisfactory
2.	Finding out what needs to be taught/ learned	5.30%	47.30%	47.40%	2.42	0.59	Very satisfactory
3.	Placing students onto courses, programs, etc.	10.50%	63.20%	26.30%	2.16	0.59	satisfactory
4.	Awarding final certificates (from schools/ programs, local, regional or national level)	21.00%	47.40%	31.60%	2.11	0.72	satisfactory
Average		11.83%	57.90%	30.28%	2.18	0.62	satisfactory

NOTE:

1.00-1.66=Not satisfactory

1.67-2.33=Satisfactory

2.34-3.00=Very satisfactory

In the respondents’ perceptions of the training received in “purposes of testing, the questions here refer to the grading and scoring elements of the working definition of assessment literacy used in this study. In most areas of LTA covered in this part, teachers reported that they had received no training: “giving



grades”, “placing students onto courses, programs”, and “awarding final certificates”. For all the areas of the purposes of training, respondents tended to wish for either basic or advanced training.

Table 4
Respondents’ Perceptions of Training Needed in Purpose of Testing (n=19)

Table 4 is the representation of respondents’ perceptions of training needed in Purpose of Testing.

Sr No.	Items	None	Yes, basic training	Yes, more advanced training	Mean	SD	Interpretation
1.	Giving grades	0.00%	47.40%	52.60%	2.53	0.50	Fully needed
2.	Finding out what needs to be taught/ learned	0.00%	36.80%	63.20%	2.63	0.48	Fully needed
3.	Placing students onto courses, programs, etc.	0.00%	47.40%	52.60%	2.53	0.50	Fully needed
4.	Awarding final certificates (from schools/ programs, local, regional or national level)	0.00%	52.60%	47.40%	2.47	0.50	Fully needed
Average		0.00%	46.05%	53.95%	2.54	0.50	Fully needed

NOTE:
1.00-1.66=No need
1.67-2.33=Still needed
2.34-3.00=Fully needed

Regarding “purposes of assessment,” teachers also perceived a fully need for training in all the above areas. The teachers did see a need for training in giving grades (M= 2.53), finding out what needs to be taught/ learned (M= 2.63), placing students onto courses, programs, etc., (M=2.53) and awarding final certificates (M= 2.47).

The following figure shows the perceived and needs training of the assessment literacy of University teachers in Myanmar.

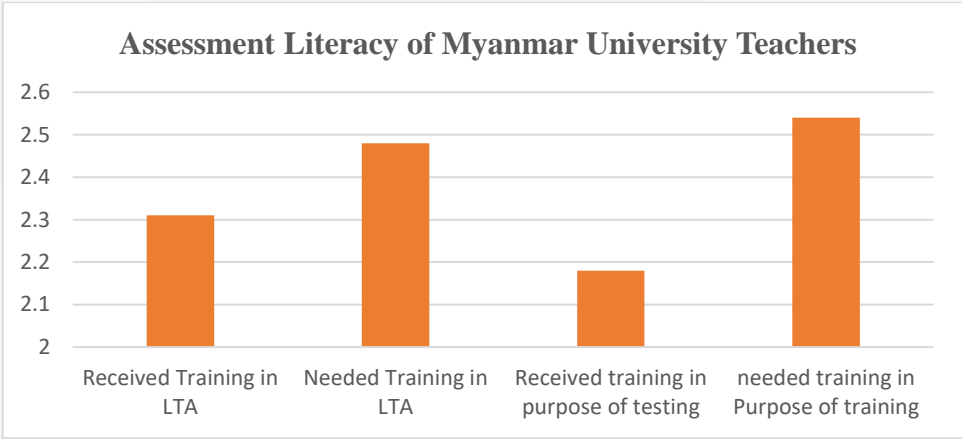


Figure1: Assessment Literacy of Myanmar University Teachers in ELT
3.2 The Perceptions of the EFL Teachers about their Needs on LTA Training

Sr No.	Interview questions
1.	<p>What type of LTA do you use in your school/ institutions? Formative or Summative assessment.</p> <p><i>Interviewee 1</i></p> <p>We use both formative and summative but summative test is periodized.</p> <p><i>Interviewee 2</i></p> <p>I use Diagnostic, formative and summative assessments.</p> <p><i>Interviewee 3</i></p> <p>I didn't remember.</p> <p><i>Interviewee 4</i></p> <p>I use formative assessment and summative assessment. Formative assessment is the most powerful type of assessment for improving student understanding and performance E.g. a very interactive class discussion; a warm-up, closure, or exit slip; on-the-spot performance; a quiz. E.g. chapter test; extended essay; a project scored with a rubric.</p> <p><i>Interviewee 5</i></p> <p>Summative assessment attempts to measure the effectiveness of learning, the student's proficiency, and their success. For this, this method uses tests, assignments, and projects for specific grading and ranking of students.</p> <p><i>Interviewee 6</i></p> <p>I have no idea because my university is computer university.</p>
2.	<p>Have you received in-service training in LTA? If yes, what was the focus of this training.</p> <p><i>Interviewee 1</i></p>



Sr No.	Interview questions
	<p>No, not yet.</p> <p>Interviewee 2</p> <p>Yes, I have. It's focused on the professional developments of teachers through systematic teaching and assessment.</p> <p>Interviewee 3</p> <p>As far as I am concerned, I didn't remember in the title of LTA.</p> <p>Interviewee 4</p> <p>I've received in-service training in LTA. The focus of this training was formative assessment and summative assessment. Formative assessment is helpful to monitor the progress of individual students. It helps teachers to catch problems using the right approach. Summative assessment is a grading system in which overall performance is graded. It helps to evaluate the understanding of a student during a specific period.</p> <p>Interviewee 5.</p> <p>LTA pinpoints areas where training is needed, and then the training module shows you step-by-step how to perform that task.</p>
3.	<p>How satisfied are you with in-service teacher training offered in LTA? What LTA training would you like in short-term?</p> <p><i>Interviewee 1</i></p> <p>I am not satisfied with the assessment training. I need effective advanced training.</p> <p><i>Interviewee 2</i></p> <p>I would like to know more about LTA as an advanced training because I didn't have any training about LTA</p> <p><i>Interview 3</i></p> <p>It enhances teacher capacity on the organizational concept of teaching, learning, and training through different assessment methods.</p> <p><i>Interviewee 4</i></p> <p>I have a little experience in LTA training. The training offered in LTA is convenient for teachers and students.</p> <p><i>Interviewee 5</i></p> <p>No, I have nothing concerned with LTA training.</p> <p><i>Interviewee 6</i></p> <p>I have little satisfied with LTA training. Assessment should integrate grading, learning, and motivation for our students. Well-designed assessment methods provide valuable information about student learning.</p>



According to the follow-up interview, some of the teachers use both Formative assessment and summative assessment. Some teachers use both formative and summative but summative test is periodized since summative assessment attempts to measure the effectiveness of learning the student's proficiency, and their success.

Regarding in-service training in LTA, the majority of the teachers did not obtain in LTA, in terms of in-service training. There are, however, some teachers who have obtained LTA training. One educator claimed to employ both formative and summative evaluations. Senior teachers claimed that the emphasis was on teachers' professional growth through structured instruction and evaluation. One teacher claimed to have taken LTA in-service training. This training's main emphasis was on formative and summative assessment. Using formative assessment to track each student's development is beneficial. It aids the teachers in identifying issues with the appropriate method. A grading approach known as summative assessment is used to grade overall performance. A student's understanding within a particular time might be assessed. by the teachers.

Concerning with in-service teacher training offered in LTA, the majority of teachers are dissatisfied with the assessment training delivered as part of LTA's teacher training. They require more efficient advanced instruction. Some participants stated that while they had no prior experience in LTA, they would like to learn more about it as advanced training. The training provided by LTA, according to a teacher in the middle of their career, is practical for both teachers and students. One teacher expressed some degree of satisfaction with their LTA training. According to a senior instructor, evaluation should incorporate learning, grading, and student motivation. Effective evaluation techniques give important insights into student learning. We can learn what the pupils learnt from them, how well they learned it, and where they had difficulties. Some educators expressed interest in attending. It is clear that assessment should integrate grading, learning, and motivation for our students. Well-designed assessment methods provide valuable information about student learning.

4. Conclusion

The study has identified three issues which are the key ones in English Language Teaching of Myanmar. These are related to the EFL teachers receive training in the LTA domains, the EFL teachers' perceived needs for training in the LTA domains and the attitudes of the EFL teachers about the LTA practices at the language programs. The results were obviously in-service teachers are feeling unsatisfied to assess student learning and claim that their lack of preparation is largely due to inadequate pre-service training in educational measurement.

The results of this study showed that training in the LTA domains is absolutely necessary in the context of EFL in Myanmar. It is clear that in-service training should concentrate on implementing various forms of assessment in language preparatory programs, even when there is a slight discrepancy between the LTA training received and needed. The needs and priorities of EFL teachers' classroom practices should be emphasized in collaborative training programs in order to improve the assessment of students' literacy and competency levels in language preparation courses. Since the teachers consistently high demand for



advanced training in LTA Domains in order to effectively integrate assessment into their teaching and novice teachers' particularly lacking in confidence in this area, the English curriculum also calls for the teachers to employ alternate strategies, but does not provide them with any significant support. Assessment literacy workshop are also required to conduct the teachers. The importance of language assessments in the educational setting of Myanmar might be linked to the presence of English Language teachers for advanced training.

5. Recommendations

The goal of the current study was to examine LTA literacy among EFL professors at Universities in Myanmar. A questionnaire given to teachers served as both the study's quantitative and qualitative stages (follow-up interviews). The majority of the teachers had either "a little" or "no" training, according to the questionnaire's results. Further research is advised in order to improve Myanmar's EFL teachers' assessment literacy and professionalism. Training in areas like test preparation for the classroom, peer and self-evaluation, item writing, interviewing, and rating, among many other areas, should be undertaken and supported in order to provide language testing and assessment to the EFL teachers inside higher education institutions. Further research should be done to confirm the results of this study in ELT using mixed- methods design.

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Introducing Eco-composition into EFL Writing Classroom

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Abstract

Eco-composition is a way of looking at literacy using concepts from ecology. It is a postprocess theory of writing instruction that tries to account for factors beyond hierarchically defined goals within social settings; however, it does not dismiss these goals. Eco-composition is a fairly new applied approach in the English composition classroom. Its application helped teachers raise environmental awareness and discuss the impact of place on writers. The purpose of this study is to explore how Eco-composition is implemented in the English composition classroom to propose introducing it to the EFL writing classroom. This is by discussing the ways in which Eco-composition is applied in the English composition classroom. In discussing those ways of applying Eco-composition into the EFL writing classroom, EFL writing teachers will have examples that would help them design Eco-composition courses that would help raising place and environment awareness.

Keywords: Eco-composition, EFL, Writing classroom

1. Introduction

In the field of English composition studies, scholars argue for the benefits of eco-composition pedagogy and place-based writing in ESL and classrooms. However, although a number of researchers have reported on the integration of place-based and ecological content into language courses, there is need for further cross-fertilization between the fields of eco-composition and foreign language studies. The emergence of eco-composition—the linking of ecology and composition—in university English classrooms has paralleled the rise of sociocultural and other context-oriented theories of foreign language studies. Eco-composition represents a similar turn toward context, emphasizing not only the social environment but also the broader physical ecosystem in which writing takes place (Weisser & Dobrin 2001). Eco-composition theorists such as Dobrin (5) point to Cooper (1986) as the first to propose an ecological representation of seeing all writing as interconnected in a web-like social system, in which each writer not only adapts to others but also exerts influence on the ecosystem as a whole (2002a). Just as composition instructors have been increasing efforts to bring ecological content into composition classrooms, language educators have also been seeking to integrate concepts from ecology into foreign language pedagogy. Vandenberg, & Clary-Lemon (2006) for instance brings ecological theories into conversation with Vygotskian sociocultural



approaches, proposing an “ecology of language learning” based on a worldview that recognizes humanity’s connection with the global ecosystem. Teachers of various subjects have reported successful engagement of English language learners in response to place-based activities, which connect students to local natural and community resources in order to support learning of English, science, and other subjects. As universities become increasingly concerned with issues of the environment within academic disciplines across the field, the development of eco-composition and its possibilities are discussed for a greening of composition studies through which to engage the world in which we live. Topics such as nature, environment, climate change, sustainability, and the relationships between writers and places increased interest in environment-oriented and place-oriented composition classes. Many educators changed their focus from cultural to environmental literacy to raise awareness to human influence on the environment (Long, 2001) and their interactions with the place. Generally, University teachers discussed environmental matters in their composition class. They encouraged their students to write about changing the world, saving nature, and sustaining ecosystems. In these courses, students read, discussed, and wrote about place and environmental problems while developing their written communication. English composition courses that included reading and writing about the place, and environmental matters are now known as eco-composition. Writing teachers referred to their courses as eco-composition to pay attention to what is going on outside the class by bringing it into their writing classes and to refer to their interest in place and environmental issues.

2. Aim of the Research

The present study explores how eco-composition is applied in the composition classroom with the aim of proposing its implementation into the EFL writing classroom. It summarizes the procedures taken by selected English teachers in teaching eco-composition to facilitate answering the main question that asks how to apply eco-composition in the EFL writing classroom.

3. Method

There is a greater demand in current teaching practices to take approaches accessing students’ background knowledge and help them construct their knowledge from this same knowledge. Ideas have shifted before from cognitive, to expressivist, to social, and now the concept has arisen where writing goes beyond the scope of society to the wider field of ecology. Eco-composition approaches to writing courses allow students to move beyond social constructions to approach their perceptions of identity. They gain a greater sense of being not only related to each other in a social sphere but as beings within an ecological structure that goes beyond socially constructed points of view. Eco-compositional approaches serve as a foundation for students to further understand their identity in a world where social concerns reflect a growing consciousness of environmental threats. This growing concern over the idea of “being green” and sustainability can be elucidated through approaches focusing on nature writing or place-based pedagogy. They learn how we define such



ecological concepts of sustainability at a social level based on environmental influences and how it relates to something much larger. Through an active political engagement of this topic, students gain purpose in their writing and direction to their writing through forms and structures of writers that have come before them. Concepts of ecology that students apply at a personal level in their reflection of identity also apply further to the structure and ecology of their own writing. Through this approach students might gain a wider ecological perspective of how diverse elements in our world cross boundaries and cause widespread effects that they may not consider if confined to a restricted concept of their own place.

4. Participants

The meaning of environment here not only covers natural places but also constructed and even imagined places. Environment covers classroom, political, ideological, historical, economic, and natural environments, as well. Dobrin & Weisser (2002b) insist that eco-composition is not just providing students with texts on nature writing; it should include the act of producing writing as well. The research tools were administered to a total of 21 English language teachers working at universities in Myanmar. They are working in English departments for undergraduate education.

1) English Teachers' Views on the Definition of Eco-composition

As a subfield in composition studies, eco-composition is regarded as a new approach that is still developing. The term was formed by combining ecology with composition (Dobrin & Weisser, 2002a) taking 'eco' from ecology and adding it to composition to state interest in place and environment. Eco-composition was defined in a variety of ways.

Table 1
English teachers' views on the definition of eco-composition (n=21)

Sr No	Definitions	Disagree	Not Decided	Agree	Mean	SD	Interpretation
1	Eco-composition is writing about places.	38%	12%	50%	2.12	0.93	Moderate awareness
2	Eco-composition is nature writing.	34%	8%	58%	2.24	0.93	Moderate awareness
3	Eco-composition is about environmental problems.	27%	11%	62%	2.35	0.88	High awareness



4	Eco-composition is the study of the relationships between environments and discourse.	13%	10%	77%	2.64	0.70	High awareness
5	Eco-composition is the act of producing writing.	17%	8%	75%	2.58	0.76	High awareness
6	Eco-composition is a new pedagogical approach to writing.	24%	7%	69%	2.45	0.85	High awareness
Average		25.50%	9.33%	65.17%	2.40	0.87	High awareness

NOTE:

- 1.00-1.66=Low awareness
- 1.67-2.33=Moderate awareness
- 2.34-3.00=High awareness

In this study, while some responses focused on ‘writing about place’ (Mean=2.12), others responded it as nature writing (Mean=2.24). Moderately, some brought environmental problems into their classroom (Mean=2.35). Mostly, high awareness has been found on the study of the relationships between environments (Mean=2.35) and discourse (Mean=2.64). According to the data, the definition mentioned in item 4 is one of the most accepted explanation regarding the influence of social environments on human development. This statement discusses that relationships between environments students grow up and every facet of their life influences the discourse they present.

2) Focus group Discussion on Eco-composition in the EFL Writing Classroom
 In a focus group discussion, English teachers suggested how Eco-composition is implemented in the English composition classroom. Participants propose implementing eco-composition in the EFL writing classroom as follows.

Participant 1:

Teaching for raising environmental consciousness should not only be limited to the composition class, but it should also be included in the EFL writing classroom. Rising temperatures are changing the world. Climate change is affecting rain forests, causing ice melting, and increasing violent storms. Natural disasters that



are caused by climate change are affecting many areas around the world. For that reason, literary educators are raising awareness through writing.

Participant 2:

Biodiversity can be achieved by implementing eco-composition into the EFL classroom. Therefore, we propose implementing eco-composition in the EFL writing classroom. The idea that was suggested was about the ways in which eco-composition applied in the EFL writing classroom.

Participant 3:

Participant 3 suggested that teachers should look at essays published in peer-reviewed journals and books published by trustworthy academic publishers so that eco-composition was considered and applied in a variety of ways including looking at physical environment, created environments, place and/or space.

Participant 4:

Participant 4 concentrated on sustainability, others integrated service learning and/or webbed environments into their eco-composition courses. English teachers are now playing a great role in raising awareness. EFL writing teachers can play the same role by broadening their writing courses' requirements to include not only advancing students' written fluency but also their relationships with place and environmental issues. They should engage students in global and local matters that are going outside the classroom by bringing them into the class through relevant readings, discussions, and writing.

Participant 5:

The EFL writing teachers can play an active role in raising consciousness and helping students understand their world by discussing the significance of sustainability, helping students appreciate and interact with their locations, engaging students in service learning, involving students in campus ecology and webbed environments, familiarizing students with suburban studies, and adopting relevant readings.

Participants in focus group discussion considered on eco-composition in the EFL writing classrooms at their university. According to them, literary educators are raising awareness eco-composition through writing to encourage students by involving in campus ecology and their learning community so as to reach in service learning. Based on their experience, they discussed the grounding of the theories of eco-composition and claim for its suitability in intermediate and advanced language learning contexts.

3) Participants' Attitude via Interview Responses on the Significance of Sustainability

EFL teachers' attitude on the significance of sustainability were recorded via interview data. We believe that environmental issues are as important as race, class, and gender because such sites of cultural conflict are so often matters of environmental injustice as well. Participants' discussion on significance of sustainability were collected as follows.

Interviewee 1:



By providing the students with the chance to write about the environment, their 'testimonies' might help in raising the faculty, administrators, and public awareness towards important environmental issues. We encouraged writing teachers to change the role of composition into a service discipline as well as their roles as educators by designing a curriculum that moves continually toward environmental stability and community revitalization. The main aim for writing teachers is to motivate 'sustainable thinking' through writing courses.

Interviewee 2:

We stressed the significance of integrating the concept of sustainability in the academic curriculum. We also defined sustainability as meeting the needs of the present without threatening the needs of the future generations. We believe that educators are responsible to create pedagogics that are local and raise the awareness to the necessity of thinking and acting sustainably. For us, it does not matter what the teacher calls the activity 'eco-composition' or 'sustainable composition.'

Interviewee 3:

Some teachers argued that designing a sustainability-based pedagogy is based on six views: 1) encouraging sustainability conscious curricula forms a sustainable society, 2) the result of careful consideration of "social traps" of unsustainability is "avoiding" them, 3) understanding the terms "antigrowth and pro-development" will show the reality of what is known as growth and development, 4) supporting sustainability, 5) refusing the existing ideas about work and labour by redesigning business and work nature, and 6) demonstrating the sustainability curriculum through college campus everyday procedures.

Interviewee 4:

For EFL writing teachers who are interested in integrating sustainability in their writing classes, there were three steps for creating a sustainable curriculum. As a first step, we ask writing teachers interested in sustainability to recognize their institutions' levels of awareness of sustainability. Secondly, we encouraged teachers to investigate other scholars' and organizations' results about 'sustainability-minded education.' This will provide teachers with essential information that would form the basis for their curriculum. The final step was to examine what has been collected and design a curriculum that promotes sustainability and offers collaboration. In fact, by following those steps, EFL writing teachers not only would be able to create writing courses that promote sustainable thinking but also would be able to create an eco-composition course related to their perceptions.

Interviewee 5:

In doing assignment on place portraits, students explored their close surroundings. Then, they created written descriptions and photographic pictures about the places they lived to help their peers envision the place. By the middle of the process, students showed photographs about their neighbourhoods to their peers and created discussion that would improve students' written texts. Finally, students published their "written and photographic studies" on a website monitored by him. One of his goals is to expand this project to include students'



writings from all around Myanmar. EFL teachers have the chance to achieve this goal by including different areas from around the world where English is the native language, a second language, or a foreign language. This will raise awareness and answer the call for international action. To write such essays, students read about the characteristics of good places and then wrote reflection essays. Later, they wrote their own descriptions of ways of changing their communities from being bad places to good places. The final stage was making reflections and comparisons between the existing situation of their communities and the ones they designed in their written portraits.

Interviewee 6:

Students who are given the assignment on neighbourhood histories studied the historical perception of their neighbourhood or a different one they are interested in. They searched their libraries and read pieces that discuss the history of their neighbourhoods. Then, they wrote imaginary images of how their place was in the past and how it will become in the future. The aim was to convince his students that they were agents of change for that community.

Interviewee 7:

In my context, firstly, students were introduced to short readings about languages' distinction. Then, they were introduced to examples of oral histories and how to make them. After that, students interviewed old family members for some hours within a number of weeks of the course. Subsequently, students either wrote their results in an interview style or as a narrative. In this stage, some students got the chance to practice translation because their relatives did not speak English.

Interviewee 8:

With some similarity with the previous sequence, students who were given the tutorial on tribal testimonies got the chance to investigate a specific culture or subculture. In this sequence, however, students concentrated on cultural activities that have meaningful values to people. Students read texts that relate them to such values, as well. As a final stage, students had the chance to publish their written texts on the web.

Interviewee 9:

Work Stories were intended to be as effective ways of relating students to their present and future interests. In this sequence, students read relevant readings that were chosen by their teachers. After that, students explained what work meant to them and wrote descriptions of what they regarded as 'good or bad' jobs. As a final assignment, students designed a plan for a job that made their employees appreciate it and feel the pleasure of working there. This sequence is significant since students' main aim of attending universities is being able to have a decent work. Making students relate their writings to their future plans about work is beneficial.

Interviewee participants discussed that environmental sustainability is important to preserve resources like clean air, water, and wildlife for future generations. Another important sustainability definition they mentioned is to ensure human society that operates with ecological borders. The aim was to convince their students to preserve the resources because they were agents of



change for that community. Thus, participants' attitude via interview responses on the significance of sustainability is found positive.

4) Focus Group Discussion on Helping Students Appreciate and Interact with their Locations

Students who were interested in environmental issues were offered the opportunity to participate in academic and residential activities. Participants discussion under this theme are as follows.

Participant 1:

We planned to give the students the chance to understand and improve their relationships with place and environment. We explained to the students the type of work that they were asked to do in the beginning of the activity. In this activity, students were familiarized with language use conventions and the process of inquiry. By teaching students careful observation, reflective thinking, disciplined research, and purposive writing, we aimed to increase students' proficiencies in thinking and writing creatively about their world.

Participant 2:

At a stage, students were offered the chance to discuss the rewards and difficulties of having efficient interactions with their neighbourhoods. We engaged the students in readings about everyday life problems, adjusting to the environment, and awareness and embracement of the environment. This gave the students the chance to see different styles and different perceptions that helped them create their own insights and writing styles. The aims were to help the students learn from their everyday experiences, position themselves in their environs, develop interaction with the environment, and become capable of expressing their ideas creatively and logically. Students writing assignments varied from reflecting on their readings and describing terminologies to writing about authors who discussed environmental problems and the environment.

Participant 3:

We assured that the activity helped us along with the students. Students not only developed understanding of literacy and environment but also learnt valuable lessons from this experience. We also encouraged writing teachers to move forward by helping students to understand how human centre gives meaning and value to the world in radically, and consequential ways. The explanations were useful in helping the reader to examine the type of readings that were introduced to students. By providing names of the authors and some titles of the books, interested teachers could go back to such books and evaluate whether they are suitable for their writing classes or not.

The responses in focus group discussion focus on helping students appreciate and interact with their locations. More students will learn more materials when they work together, cooperatively, talking through the material with each other and making sure that all group members understand, than when students compete with one another or work alone, individualistically.



5) Interview Responses on Engaging Students in Service Learning

By working together outside the classes and in the communities, students improve their confidence and communicating skills and “succeed in composition activities such as peer review and substantive revision” (Ingram, 2001, p. 210). Students become familiar with basic environmental matters as well. Similarly, teachers participate in in-service work while teaching and become more aware of their local community. Discussion on engaging students by reading the environment in service learning were mentioned as follows.

Interviewee 1:

Environmental Readers provided varied collection of essays, articles, short stories, and poems and covered a variety of topics on nature and environment. These collections were written by different writers such as naturalists, journalists, poets and others. They were selected with the aim of introducing the students to the world around them, encouraging critical reading, and facilitating writing about their relationship with nature, the world, and themselves.

Interviewee 2:

Teachers began by introducing the students to common topics related to place by asking them to write, personal essays about places they know well. Following that, students read and wrote about different topics that include their experiences with wilderness, environmental ethics, other species, and environmental engagement. The arrangement of the assignments should start from being personal, local and familiar and moved to being more abstract, global and unfamiliar.

Interviewee 3:

First, we engaged our students in ‘short research papers’ to improve their library skills and their ability in using sources. Then, students started their ‘research paper project’. In this stage, students applied the skills they had learnt while conducting the small research projects.

Interviewee 4:

We as EFL writing teachers might find the brief description of integrating eco-composition with service-learning motivating and can be applied in our writing classrooms.

Thus, interviewees consider that through service-learning, students engage with their learning in powerful ways, helping them to increase their academic engagement and performance, civic engagement and desire to help others. They acquire 21st century proficiencies like collaboration, communication, and critical thinking, as well as increase social-emotional skills like task persistence, intellectual curiosity, and ability to work in teams. Students connect to the community and to their classmates in ways that are far more powerful than simple cooperative learning. And by applying their knowledge and skills to solve actual community problems, students experience the real-world value of what they are learning in university.

3. Discussion

Drawing on a growing list of current environmental concerns, language teachers make a call for English literary instruction, making a claim to how teachers’ choice in literature can encourage various perceptions among students



about what is deemed valuable in society based on the themes and values found in these established works. Through a place-based approach to composition, language teachers should encourage a pedagogical approach where students are encouraged to be critically aware of the influences of their environment beyond the social as it influences their literacy. After that, teachers should go further in suggesting that through in-depth personal writing students can gain a better understanding of their environment and inspire a stronger connection to it towards to purpose of social action. This teaching approach relies heavily on an ecocritical approach encouraging the use of legal texts in nature writing to help students connect with environmental concerns as an important theme in literature. Through studying literature students can learn from the rhetorical choices of others. This approach may be somewhat limited in an early composition course as not all students (and indeed very few in some cases) may be distanced from natural environments about which to write. Through this, students may struggle in identifying with concepts of environment in a more general sense when posed so strongly with environment in a natural sense (particularly if relying heavily on canonical literature that students may view as much higher in quality than they could ever produce) used in this approach. We also consider an ecological approach to social structures and how they are defined by their environments and discursively participate in the definition of other groups. It has been suggested that the social elements that define our perceptions of meaning, and way students write is affected by what is known to them in their environments. The shift of features in environments can have just as much effect on a student and their approach to composition as the social groups that influence their worldviews. Teachers should try to apply this ecological development to the ways in which experienced writers seek peer approval and input for a piece of writing. Eco-composition works to make students be critically evaluative of their environments, how these environments have shaped them as writers, and how these environments are connected to other environments in a wide web of socially influential networks.

4. Conclusion

As said by Hurlbert (2006), it was writing inspired by place that teaches others about love of place. EFL writing teachers should be encouraged to integrate eco-composition into their writing classrooms not only to raise awareness to significant issues but also to help students relate their foreign language to places they love. Many EFL students are required to take language proficiency tests which examine their language fluency by providing readings and writing prompts related to many environmental issues. Therefore, by integrating eco-composition into the EFL writing classroom, students not only learn to appreciate, respect and love their places but also will be prepared for such topics. When students are given the chance to choose the readings, writing teachers should use multidisciplinary environmental themes. The accessibility of some governmental documents related to ecological matters help students gain understanding about these issues and how to deal with such documents. Another point to consider is the significance of relating local issues. Writing teachers should equalize the teaching of localization and global matters during service-learning projects. For instance,



while students dealing with a local issue, they can relate it and compare it to another place. It is widely known that writing affects people and can make a change. Therefore, it is the responsibility of EFL writing teachers to change their writing classes to more effective writing experiences. Relating the students to their place and raising their awareness to their environment is a vital duty. In today's environmental changes, it is better to start than wait for others to take action.

5. Recommendation

Through the lens of technical writing, the concept of eco-composition and eco-poetics are regarded as a study of place as site in relation to various workplace studies. Scholars make several suggestions for pedagogical revisions in closing including the use of environmental themes and stressing their interdisciplinary nature in composition, stressing the ecocritical approach of place-based learning for both physical and abstract sites such as cyberspace, and showing the live interconnectedness of these places and how there is an ecology in these sites.

By addressing traditional, cognitive, and expressivist approaches, the writing process is primarily internal to the students to indicate an ecological view of writing. While social paradigms encourage attention to the immediate context of a writer that immediate context is influenced by a much wider network of social and environmental constructions. This study presents more teachers' idea than practical classroom approaches.

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Perceptions of University Teachers on Personal Skills of Teacher Leaders

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Abstract

Teacher leaders' roles and characteristics are many and varied. Though teachers may serve in formal roles, such as faculty dean, department head, subject leader, supervisor, or mentor, many teachers taking on leadership roles do not view themselves as leaders. Rather, they value the informal and organic nature of leading by example, collaborating, and sharing experiences with their colleagues. Currently, teacher leadership studies have identified characteristics of teachers who assume leadership roles. This research used the Teacher Leadership Inventory and the Teacher Efficacy Belief Scale – Collective in selected universities. Findings indicate the essential personal skills of EFL teachers that might be necessary to fill the role of a teacher leader in the context of Myanmar. This research also highlights the teachers' perceptions of the characteristics of teacher leaders as well as qualities to ensure teacher leadership is valued and possible.

Keywords: University teachers, Personal skills, Teacher leader

1. Introduction

According to BPS (Boston Public Schools), teacher leadership is the formal and informal ways teachers leverage their varied expertise, diverse voices, and professional agency to promote innovation and collaboration that strengthens the capacity of BPS colleges, school leadership, and the central office staff to impact adult learning and student outcome. Simply, teacher leadership is described as a process of influencing others. The existing literature is limited by small, homogenous samples and poor study designs that make it difficult to draw conclusions. The qualities have been demonstrated by teacher leaders, such as integrity, commitment, strong communication skills, expertise, courage, discernment, focus, generosity, initiative, passion, positive attitude, problem-solving abilities, and responsibility. Universities need and deserve teacher leaders who demonstrate these qualities. For Teacher Leaders to flourish, certain characteristics and conditions must be present. Teacher leaders must possess the knowledge and skills needed to lead. To be seen as a leader, they must also have a set of positive dispositions and attitudes. Finally, there must be opportunities for leadership in the school, district, or larger context. Katzenmeyer and Moller (2001) affirm how teacher leaders lead inside and outside of classrooms, nurturing other teachers to become leaders and influencing improved educational practice. Teacher leaders are best developed as they demonstrate best practices



in the big three of curriculum, instruction, and assessment, show an understanding of university cultures as they initiate and support change, and support the development of colleagues in a variety of settings. Teacher leaders work optimally when addressing a recognized need, working directly in classrooms with teachers, focusing on student learning, and ensuring support from the principal. Teacher leaders find meaning and satisfaction in their leadership roles because they believe they are making a difference in the learning of students and colleagues while receiving recognition and earning professional respect for what they do and contribute (Birky, Shelton, & Headley, 2006). Reason and Reason (2007) concur that intentionally facilitating the work of teacher leaders builds the capacity to drive change in improving universities. Achieving the goal of university improvement depends on rewarding, recognizing, and appreciating the work of teacher leaders and all teachers as they enhance instructional practice resulting in increased student learning. By celebrating the learning of each teacher and student and the outcome of continuous educational improvement, the self-esteem of teacher leaders is reaffirmed, and teachers' motivation to teach and lead is celebrated. Teacher leaders potentially can lead their colleagues to optimal performance levels based on a shared commitment to student learning, empowerment, relationships, and collaboration, or what Blanchard, Parisi-Carew, and Carew (2009) describe as high-performing teams. Lieberman and Friedrich (2010) affirm teacher leaders focus on students, collaboration among teachers, and a commitment to learning. Increased morale, professional status, and work satisfaction are recognized and appreciated by university administrators, parents, and students.

1.1 Personal Skills of Teacher Leaders

The eight categories of knowledge, skills, and dispositions that teacher leaders need to be effective in a variety of roles are as follows. Each category includes a vignette illustrating teacher leaders' dilemmas, as well as reflective questions to prompt thinking and discussion. A resource list for each category is also included.

1.1.1 Work Ethic

Teacher leaders have been described as perseverant, resourceful, action-oriented committed, and passionate. The passion they have for their mission allows teacher leaders to find the courage to persist in the face of adversity and obstacles (Danielson, 2006). Of note, this skill, with its close links to conscientiousness, has been demonstrated in meta-analytic studies to be one of the best predictors of workplace performance across a range of occupations.

1.1.2 Teamwork

Because teacher leaders must work with many constituencies (to improve teaching practice and promote positive change within the larger learning community) they should have good teamwork skills. They must possess the ability to build solid relationships with colleagues, parents, students, administration, and the community. To build such relationships, they must be able to engender trust, work well with colleagues, communicate effectively, and resolve conflict (Danielson, 2006; Killion & Harrison, 2006).



1.1.3 Leadership

Closely related to teamwork skills are leadership skills, as, often, leadership is necessary to promote good teamwork. Teacher leaders can lead by engaging, inspiring, and motivating others to improve and become better through their actions (Bascia, 1996). They can lead by effectively communicating with colleagues and informing them of their goals in ways that garner support for their vision for the university (Danielson, 2006).

1.1.4 Openness

Teacher leaders are adaptable, open-minded, and creative. They are open to exploring options to gather the necessary resources to improve the state of education. Furthermore, teacher leaders can adapt and adjust to situations through their creativity and flexibility (Danielson, 2006; Killion & Harrison, 2006).

1.1.5 Vision

Related to the concept of openness to new ideas, a good teacher leader has enough vision to be able to identify opportunities for improvement or to fix problems within the university. They also have the ability to see the big picture and how what they are doing fits into the larger goal of student learning. They actively seek out such opportunities rather than simply waiting for them to appear (Danielson, 2006).

1.1.6 Positive Affect

Positive emotions have been demonstrated to have a number of beneficial outcomes. For example, the presence of positive emotions can help people to think more creatively, deal with stressful situations, be more engaged in activities, and build social relationships (e.g., Fredrickson, 1998). As such, it is not surprising that successful teacher leaders often succeed with the help of positive affect. Their tendency to display optimism, enthusiasm, and confidence leads others to think creatively and work together to solve problems (Danielson, 2006).

1.1.7 Risk Taking

Teacher leaders are willing to take risks in order to achieve their goals. They are willing to take the chance to attempt new and innovative initiatives despite the fact that what they are doing may end up failing and expose them to external criticisms (Danielson, 2006).

1.1.8 Teaching-Related Skills

Teacher leaders are also good teachers. They display outstanding teaching skills, hold a comprehensive philosophy of education, and are relatively altruistic (Katzenmeyer & Moller, 2001). Furthermore, they have a deep understanding of various theories and practices of teaching (Killion & Harrison, 2006). Teacher leaders are willing to expand their role as teachers to develop their careers and have the time, energy, and patience required to assume such a role.

2. Methodology



A quantitative research method was used, and data were collected through a questionnaire survey. The questionnaire was piloted with two teachers for additional feedback on the clarity of the items. The participants were selected randomly and consisted of 13 (2 males and 11 females) English teachers from the Departments of English in Higher Education, Myanmar. The participants were asked to mark the strategies use on a 3-point Likert scale: (1) disagree (2) agree, and (3) not sure.

Another 3-point Likert scale has (1) not important (2) important, and (3) not sure.

3. Results

For teacher leaders to meet the standards, they should possess most, if not all, of the personal skills listed in Table 1. Data collected from 13 English teachers have been mentioned as follows:

Table 1
Awareness of university teachers on personal skills of teacher leaders by various scholars (n=13)

Sr No	Personal Skills	Sub-Skills	Responses			M	SD	Interpretation
			Disagree	Not Sure	Agree			
1	Work ethic (York-Barr Duke, 2004) &	Teacher leaders have been described as perseverant, resourceful, action-oriented committed, and passionate.	0.00%	0.00%	100.00%	3.00	0.00	Have a proficient-level skill
		The desire teacher leaders have for their mission allows teacher leaders to find the courage to persist in the face of adversity and obstacles.	0.00%	0.00%	100.00%	3.00	0.00	Have a proficient-level skill
Average			0.00%	0.00%	100.00%	3.00	0.00	Have a proficient-level skill
2	Teamwork	Because teacher leaders must work in many	0.00%	0.00%	100.00%	3.00	0.00	Have a proficient-level skill



Sr No	Personal Skills	Sub-Skills	Responses			M	SD	Interpretation
			Disagree	Not Sure	Agree			
	(York-Barr & Duke, 2004)	areas (to improve teaching practice and promote positive change within the larger learning community) they should have good teamwork skills.						
		Teacher leaders must possess the ability to build strong relationships with partners, parents, administration, and the community.	0.00%	15.38 %	84.62%	2.85	0.36	Have a proficient-level skill
		Average	0.00%	7.69%	92.31%	2.92	0.18	Have a proficient-level skill
3	Leadership (Bascia, 1996)	Teacher leaders can lead by engaging, inspiring, and motivating others to improve and become better through their actions.	0.00%	0.00%	100.00 %	3.00	0.00	Have a proficient-level skill
		Teacher leaders are able to lead by effectively communicating with partners and informing them of their goals in ways that gain	0.00%	0.00%	100.00 %	3.00	0.00	Have a proficient-level skill



Sr No	Personal Skills	Sub-Skills	Responses			M	SD	Interpretation
			Disagree	Not Sure	Agree			
		support for their vision for the university.						
Average			0.00%	0.00%	100.00%	3.00	0.00	Have a proficient-level skill
4	Openness (York-Barr & Duke, 2004)	Teacher leaders are flexible, open-minded, and creative.	0.00%	0.00%	100.00%	3.00	0.00	Have a proficient-level skill
		Teacher leaders are open to exploring options to gather the necessary resources to improve the state of education.	0.00%	23.08%	76.92%	2.77	0.42	Have a proficient-level skill
		Furthermore, teacher leaders are able to adapt and adjust to situations through their creativity and flexibility.	0.00%	15.38%	84.62%	2.85	0.36	Have a proficient-level skill
		Average	0.00%	12.82%	87.18%	2.81	0.39	Have a proficient-level skill
5	Vision (Danielson, 2006)	A good teacher leader has enough vision to be able to identify opportunities for improvement or to fix problems within the university.	0.00%	23.08%	76.92%	2.77	0.42	Have a proficient-level skill
		Teacher leaders actively seek out such opportunities	0.00%	23.08%	76.92%	2.77	0.42	Have a proficient-level skill



Sr No	Personal Skills	Sub-Skills	Responses			M	SD	Interpretation
			Disagree	Not Sure	Agree			
		rather than simply waiting for them to appear.						
		Teacher leaders also have the ability to see the big picture and how what they are doing fits into the larger goal of student learning.	0.00%	15.38%	84.62%	2.85	0.36	Have a proficient-level skill
Average			0.00%	20.51%	79.49%	2.81	0.39	Have a proficient-level skill
6	Positive affect (Danielson, 2006)	It is not surprising that successful teacher leaders often succeed with the help of positive affect.	0.00%	7.69%	92.31%	2.92	0.27	Have a proficient-level skill
		Their movement to show optimism, enthusiasm and confidence leads others to think creatively and work together to solve problems.	0.00%	15.38%	84.62%	2.85	0.36	Have a proficient-level skill
Average			0.00%	11.54%	88.47%	2.88	0.31	Have a proficient-level skill
7	Risk-taking (Danielson, 2006)	Teacher leaders are willing to take risks in order to achieve their goals.	0.00%	38.46%	61.54%	2.62	0.49	Have a proficient-level skill
		Teacher leaders are willing to take	7.69%	30.77%	61.54%	2.54	0.63	Have a proficient-level skill



Sr No	Personal Skills	Sub-Skills	Responses			M	SD	Interpretation
			Disagree	Not Sure	Agree			
		the chance to attempt new and innovative plans despite the fact that what they are doing may end up failing and expose them to external criticism.						
Average			3.85%	34.62%	61.54%	1.84	0.40	Have an intermediate-level skill
8	Teaching related skills (York-Barr & Duke, 2004).	Teacher leaders have a deep understanding of various theories and practices of teaching.	7.69%	7.69%	84.62%	2.77	0.58	Have a proficient-level skill
		Teacher leaders are willing to expand their role as teachers to develop their careers and have the time, energy, and patience required to assume such a role.	7.69%	0.00%	92.31%	2.85	0.53	Have a proficient-level skill
Average			7.69%	3.85%	88.47%	2.81	0.55	Have a proficient-level skill
Average			1.28%	11.97%	86.75%	2.85	0.39	Have a proficient-level skill

NOTE:

1.00-1.66=Have a preliminary understanding of the skills

1.67-2.33=Have an intermediate-level skill

2.34-3.00=Have a proficient-level skill



In table 1, we explore the awareness of university teachers on the personal skills of teacher leaders by various scholars. Interestingly, most participants agreed that for teacher leaders to meet the standards, they should possess most, if not all, of the skills listed in Table 1 (Average Mean=2.85). According to the questionnaire responses, for a teacher to be able to meet personal skills, the teacher leaders can apply work ethics (Mean=3.00) and leadership (Mean=3.00) in the Myanmar university context. The data mentioned that they should have teamwork, openness, vision, positive affect, risk-taking, and teaching-related skills also listed in Table 1.

Table 2

Perceptions of university teachers on characteristics of teacher leaders (Source: Lieberman and Friedrich, 2010)

Sr No	Personal Skills	Sub-Skills	Responses			Calculation		Interpretation
			Not Important	Not Sure	Important	M	SD	
1	Focus on student learning	Curriculum	0.00%	7.69%	92.31%	2.92	0.27	High awareness
		Instruction	0.00%	7.69%	92.31%	2.92	0.27	High awareness
		Assessment	0.00%	0.00%	100.00%	3.00	0.00	High awareness
Average			5.13%	94.87%	5.13%	2.95	0.18	High awareness
2	Focus on collaboration among teachers	Supporting the development of colleagues in a variety of settings	0.00%	0.00%	100.00%	3.00	0.00	High awareness
		Nurturing other teachers to become leaders	7.69%	15.38%	76.92%	2.69	0.61	High awareness
		Influencing improved educational practice	0.00%	15.38%	84.62%	2.85	0.36	High awareness
Average			2.56%	10.26%	87.18%	2.85	0.32	High awareness
3	Focus on the commitment to learning	Initiate and support change	0.00%	7.69%	92.31%	2.92	0.27	High awareness
Average			1.10%	7.69%	91.21%	2.90	0.33	High awareness

**NOTE:**

1.00-1.66=Low awareness

1.67-2.33=Moderate awareness

2.34-3.00=High awareness

One characteristic is represented in the work of the teachers, who are aiming to develop the nation's teacher leadership. As can be seen in Table 2, they have a high awareness of all three characteristics of teacher leadership. He or she should focus on student learning (Mean=2.95), collaboration among teachers (Mean=2.85), and commitment to learning by applying pedagogical knowledge (Mean=2.92).

Table 3

Perceptions of university teachers on the qualities shown by teacher leaders (Maxwell, 1999)

Sr No	Qualities	Responses			Calculation		Interpretation
		Not Important	Not Sure	Important	Mean	SD	
	Having honesty	0.00%	7.69%	92.31%	2.92	0.27	High awareness
	Having responsibility	0.00%	0.00%	100.00%	3.00	0.00	High awareness
	Having strong communication skills	0.00%	0.00%	100.00%	3.00	0.00	High awareness
	Having capability	0.00%	7.69%	92.31%	2.92	0.27	High awareness
	Having courage	0.00%	15.38%	84.62%	2.85	0.36	Low awareness
	Having judgment	0.00%	15.38%	84.62%	2.85	0.36	Low awareness
	Having focus	7.69%	0.00%	92.31%	2.85	0.53	Low awareness
	Having kindness	0.00%	15.38%	84.62%	2.85	0.36	Low awareness
	Having idea	0.00%	0.00%	100.00%	3.00	0.00	High awareness
	Having enthusiasm	0.00%	0.00%	100.00%	3.00	0.00	High awareness
	Having positive attitude	0.00%	15.38%	84.62%	2.85	0.36	Low awareness



Sr No	Qualities	Responses			Calculation		Interpretation
		Not Important	Not Sure	Important	Mean	SD	
	Having problem-solving abilities	0.00%	7.69%	92.31%	2.92	0.27	High awareness
	Average	0.59%	6.51%	92.90%	2.92	0.29	High awareness

NOTE:

1.00-1.66=Low awareness

1.67-2.33=Moderate awareness

2.34-3.00=High awareness

After that, university teachers evaluate the qualities shown by teacher leaders as described in the standards. According to the data, they may have considered having courage, having judgment, having focus, having kindness, and having an attitude. are associated with each technique, and conclude with our recommendations for the use of each methodology in the assessment of teacher leadership.

4. Discussion

Quality education entails issues such as appropriate skills development, gender equality, and the provision of relevant school infrastructure, equipment, educational materials, and resources. For quality education, teachers need to possess non-positional teacher leadership skills and empower each other through mutual inspiration, moral support, and knowledge sharing. In creating a high-performing university and educational reform, teacher leadership should be encouraged. To encourage teacher leadership, policymakers must value and respect the role and work of teacher leaders; embrace change, and allow data-driven, research-based risk-taking; provide affirmation for teachers' leadership tasks; promote and facilitate collaboration; provide technical support for teacher leaders; empower teachers in their leadership tasks; involve faculty in decision making. To date, much of the research conducted in this area is descriptive and policy-driven, with a focus on program descriptions, roles, and implementation. Most studies do not obtain their research questions and study design from formal theories, and change has tended to be measured in indirect ways, leaving the reader to determine whether or not the implementation of teacher leadership programs was effective or ineffective. In many cases, the view of teacher leadership presented is limited by narrow perspectives, specifically attending to one type of leadership and focusing only on the teacher as a leader isolated from their other roles within the university. More research is required to address even basic research questions. However, to conduct any empirical study, there is a need for measures of teacher leadership skills and knowledge.



5. Conclusion

The survey asked teachers to indicate what university teachers see in the personal skills of teacher leaders about the personal skills of teacher leaders by various scholars, characteristics of teacher leaders, and qualities shown by teacher leaders in the Myanmar university context. Responses to the questionnaire indicate some broad trends. Levels of agreement with the points varied between 61.54% and 100%. This can be interpreted as indicating that it is acceptable for teachers to take steps to improve their practice and, that it is acceptable that those with specific responsibilities such as heads/chairs of subject departments, should exercise such leadership within their designated sphere of influence. This is particularly significant to encourage them to exercise leadership more widely. If teacher leadership is to become formalized into another level of the teaching profession, valid and reliable assessments of teacher leadership are needed. The current study provides some ideas for initial steps toward providing such assessments. However, much more work is needed. Research on teacher leadership requires much more definitional clarity with which researchers can create precise operations and measurements.

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Collaborative Writing Project in the Literature Classroom of English Specialization Undergraduate Students

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Abstract

Many universities today promote collaborative work in disciplines such as arts and science projects, but the study of literature generally seems to discourage the collective process, perhaps because literary production itself is seen as an act of individual creativity. One could apply the principles of collaborative work to writing about English literature, and if so, it would encourage both the understanding and appreciation of the literary text, and also enhance the writing skills of students, especially in the case of English language learners. This research is a study of English major students at Banmaw University in Myanmar, to discover whether the students accomplish better in an individual or a collaborative writing exercise on literary topics, and also to evaluate their experiences of the two different types of writing. It was found that although some students stated doubts about collaborative writing, most were excited about the experience, and felt that it had improved not only their understanding of the literature but also their academic writing skills. However, as there were so many other variables involved, in terms of differences in the linguistic skills and personalities of the participants, it would be difficult to come to any final conclusion about the benefits of collaborative writing and language improvement.

Keywords: Collaborative student writing, Literature classroom, English specialization, Undergraduate students

1. Introduction

According to the Ministry of Education in Myanmar, Higher Education aims to promote the learners' writing skills by performing collaborative writing or group work in a shorter time. Its main target is to promote the skills for their lifelong processes: social skills, problem solving skills, critical thinking skills through collaborative work. Collaborative writing is an interactive and social process that involves a team focused on a common objective that negotiates, coordinates, and communicates during the creation of a common document (Lowry, 2004). Sometimes collaborative writing, however, seems to expose many difficulties in literature class rooms. Literary writing is commonly a solo act. Diverse ideas deviate the main message of the text and stylistic consistency cannot be found. This challenge can be overcome by adopting some activities and strategies implemented by great scholars. Collaborative writing involves more than just *writing*. Writing researchers have identified seven core activities: brainstorming, conceptualizing, outlining, drafting, reviewing, revising and editing (Berndt, 2011). He also claimed that a common vocabulary must be conceptualized that different people working in a team or teams can use to communicate in collaborative writing. Another primary challenge is the imbalance in efficiency of students. One-for-all writing becomes popular among some students.



1.1 Aims of the Study

This study aims to find out how collaborative writing on literary texts can improve the academic skills of the students to some extent. This study also aims to find out what principles should be applied in assigning collaborative writing on literary texts to literature students.

1.2 Limitation of the Study

The study is limited to undergraduate level writing on literary texts prescribed by the department of English at Arts and Science Universities during the academic year 2022-2023. Seventy-four students were selected to be the questionnaire participants of the present study.

1.3 Collaborative Writing

Collaborative writing is a team work through sharing knowledge, cooperating, communication and interaction. Collaboration not only draws on the expertise and energy of different people but also can create an outcome that is greater than the sum of its parts. As a pedagogical foundation of education, collaborative writing becomes popular for decades. Students write an assignment or term paper in groups with equal share of tasks. During the process of their writing, they discuss the topic, share knowledge, review the work and understand and motivate one another. Collaborative writing is the process of producing a written work as a group where all team members contributed to the current and the decisions about how the group will function. In collaborative writing, students achieve their goal through collaboration. In 1998, Rise B, Axelrod and Charles R. Cooper published the book entitled *The St. MARTIN'S GUIDE TO WRITING*". In this book, the authors mentioned that collaboration not only draws on the expertise and energy of different people but also can create an outcome that is greater than the sum of its parts.

2. Method

This study was designed to address the following main questions.

- (i) Do the students have good experience in collaborative writing?
- (ii) Do the students accomplish better in an individual or a collaborative writing exercise on literary texts.

2.1 Participants and the Procedure

The population consisted of 47 first year students who are specialising in English. The number of male is 19 and that of female is 28. The limitation of the study is that all the students are first year and they all are from Banmaw University.

The procedure adopted by the researchers has been divided into two steps. The first step is examining the students' background information on collaborative writing. The researchers used three questionnaires. The second step is exploring their experiences. Here, eight questionnaires were used.

2.2 Data Analysis

In this research, collected data from the questionnaire were entered into and analysed statistically via SPSS (version 20.0). To analyse and report the gathered data, Mean and Standard Deviation were estimated.



3. Results

The data obtained was analysed qualitatively. Each questionnaire was handled separately and the common answers from students were put together to observe an overall attitude. On the basis of the answers of the students, the statement that most students are familiar with co-operative study and co-operative writing. Many are willing to do co-operative writing on literary texts. They believe collaborative writing can improve their academic skills as well as social skills. Some, however, don't prefer collaborative writing on literature texts. Some students are argumentative. They only prefer their ideas. They don't want to negotiate with others. They feel that some students are not active and, in some occasion, one has to control the whole writing. Some feel excited about time constraints.

Table 1
Background Information

Table 1 represents the background information of the students. The detailed information of the participants about collaborative writing are vividly describe in the table. It also mentions their experiences in their academic writing.

Table 1: The background Information of the participants on collaborative writing

1.	What do you understand by collaborative writing?	Group Writing	60%	
		Team writing	25%	
		Writing in cooperation	8%	
		Writing in communication.	2%	
		Writing in negotiating	5%	
2.	Have you ever done any form of collaborative study during your education? Y/N If yes, describe what you did (It may have been a school project, in English/Myanmar):	Yes	98%	(i) Reading comprehension (ii) Making up stories (iii) Composing essays (iv) Solving problems
		No	2%	
3.	Have you ever done any collaborative writing (in English/ Myanmar) before this? Y/N If yes, describe what you did:	Yes	100%	(i) poster Writing (ii)paraphrasing poetries (iii)analysis of characters in short stories
		No	0%	

The first part of the research is concerned with students' experience with collaborative writing. Of the respondents to question number one "What do you



understand by collaborative writing", majority (60%) said that it is group writing. 25 % said that team writing. Writing in communication is 2% and writing in negotiating is 5%. According to question number two, almost all (98%) have done collaborative study -reading comprehension, making up stories, composing essays and solving problems. The respondents to question three expressed that all of the students have done collaborative writing. They are poster writing, paraphrasing poetries and analysis of characters in short stories.

Table 2
Examining students' preference on collaborative writing to individual writing

Table 2 represents examining students' preference on collaborative writing to individual writing.

1.	How many people were there in your group?	4	100%
2.	How did you divide the work among yourselves? (Choose from the options)		
	(i) the group discussed the topic, divided the various aspects and then each member wrote his/her part; the group compiled the individual parts, and revised the whole document at the end.		80%
	(ii) the group discussed the topic and outlined the writing task, then one member prepared a draft; the group edited and revised the draft		9%
	(iii) one member of the group planned and wrote a draft, the group revised the draft		4%
	(iv) one person assigned the tasks, each member completed the individual task, one person compiled and revised the document		4%
	(v) Any other? (Please specify) one has to control the whole work		3%
3.	Do you feel the work was divided equally between all members?	Yes	95%
		No	5%
4.	Do you feel you had to do more than the others?	Yes	9%
		No	91%
5.	Do you feel that one of the members did less than their share? If yes, how did you deal with this problem?	Yes	85%
			-Persuade him/ her to involve
			-Share their knowledge
		No	15%
6.	What were some of the other problems you faced in doing this exercise? How did you overcome these?	(i) Some review negatively (ii)Some review one destructive (iii)Some want to monopoly the whole reading (iv)Some don't take responsibility (v) Time management is sometimes difficult.	



7.	Do you feel your writing skills improved at the end? In what way?	Yes	100%	-through diverse ideas -through problem-based thinking -through unity
		No	0%	
8.	You have written one assignment individually and one assignment collaboratively in two of your courses this semester. Which did you prefer? Give reasons for your choice.	Collaborative assignment	80%	-repeatedly reviewed product is created -Mutually understanding one another -being motivated
		Individual assignment	20%	-not being controlled by other ideas -free from time constraints

For the second part of the survey, the students were asked to write the paraphrasing of a selected poem. Eight questions were formed. The following fact were found. For the response to question one the number of students in a group were four. According to the answers to the question number 2, most of the students divide the works among themselves in the way of option 1 “the group discussed the topic, divided the various aspects and then each member wrote his/her part; the group compiled the individual parts, and revised the whole document at the end”. Another interesting fact is option 5 “one has to control the whole work”. He could have better knowledge and experience than others.

Most of the students felt that the work was divided equally between all group members. They don't feel they had to do more than others. But, many of them (85%) feel that one of them did less than their share. They persuade him to involve and share their knowledge. They have to face other problems during the team work. Some review negatively, some one's writing destructive, some want to monopoly the whole process, some don't take responsibility and time management is sometimes difficult. 100% of the students feel that their writing skills improved at the end through, through problem-based thinking and through unity. According to question eight, many of the students (80%) prefer collaborative writing than individual writing. Because, a repeatedly reviewed product is created through collaborative writing. They understand one another and they feel motivated. The rest of the students (20%) like individual writing. Because they feel that they are not controlled by others' ideas and they are free from the pressure of time constraints.

4. Discussion

Data collected through survey showed that most English specialization undergraduate students in Myanmar have accomplish their academic writing through collaborative writing. They assume that collaborative writing is a group work through team spirit, co-operation, communication and negotiation. There were 4 members in a group. They are assigned to work equally and with the same amount of time. Many cases were found in which a member neglected his responsibility. Other students encourage him to participate and share knowledge. Some students, however, some



students were willing to control the whole process. Students faced other problems. Some students made negative and deconstructive reviews. They felt anxious about time constraint. According to Lowry (2004), collaborative writing is an act of processing a document where learners produce a written-shared document based on certain shared concern. Storch (2013) stated that in its broader sense, collaboration refers to the act of labour-sharing and thus collaborative writing is a collective cognitive process where multiple writers negotiate and share co-authority and responsibility for the production of a text. Data collected through survey showed that students' writing skills improved at the end with the practice of collaborative writing. Diverse ideas, problem-based thinking and unity make them proficient in academic writing skills. Montero (2005) argued that collaborative writing is a strategy in which the student's teams up with one or more peers to go through the writing process of brainstorming, organizing, outlining, editing draft and agreeing on the final product.

Many students prefer collaborative writing to individual writing on literary work. Their writing was reviewed many times by group members. They feel being motivated and understanding one another. But, some students feel excited with group works in literary texts. They see that language consistency is difficult to get through collaborative writing. This may be for the fact that they have good language skills than other people or they pay much concentration to the improvement of his academic writing skills.

It was noticed that levels of students' language proficiency are remarkably different. The students with poor academic writing skills could be trained to see collaborative writing as a motivation process for them. Miller and Meece (1997) pointed out that the use of appropriate teaching strategy may effect on students' motivation. The teacher should select a certain strategy, such as collaborative strategy to enhance students' motivation because by doing this way, they work on tasks in team in which they can share ideas. It may decrease their reluctance in doing the task due to their uncertainty and disability. Similarly, Lorelei Lingard (2021) pointed out in "Collaborative writing: Strategies and activities for writing productively together" that writing collaboratively can be the best of times and the worst of times. At best, it is richly rewarding. At worst, it is deeply frustrating.

5. Conclusions

This study pointed out the impact of collaborative writing on the improvement of learners' academic skills and life skills. Teachers could be aware of the individual efficiency of students before assigning them into groups. Students' could be motivated through expected outcomes of co-operative writing or co-operative study. Furthermore, group works on literary text may deviate to grasping the main theme of the targeted text. This situation could be handled by well-experienced teachers with collaborative study.

6. Recommendations

According to the obtained results, the following points are recommended:

- (a) Literature learning students should be assigned with collaborative writing on literary texts
- (b) For researchers to conduct similar research on non-literary texts.
- (c) Arranging workshops to train both linguistics and literature teachers and expose them to the challenges of collaborative teaching



- (d) Another research can be conducted for the fourth-year students as part of their writing practice in collaboration to examine their ability in overcoming challenges in their academic life.

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Poetry Texts of EFL Undergraduate Course in Myanmar

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Abstract

This research draws on applying the tools of pedagogical stylistics in teaching literature in particular poetry to English as a foreign language (EFL) undergraduate student. The language of literature is rich with social context, exquisite deviant forms, and vocabulary. This study aims at examining to what extent pedagogical stylistics can be helpful in increasing students' literary awareness. In addition, to examine how it can help them to interpret and analyse selected poems that have been chosen for them to achieve this goal. For the purpose of gathering the required data, documentary analysis was conducted. Verdun's (2013) approach is adopted in teaching stylistic tools to the students. Moreover, a questionnaire is distributed to know students' opinions about studying stylistics. The final results proved that (i) pedagogical stylistics tools are found a great significance to pay heed to the language of poetry or literary language in the assigned poetry books, (ii) the questionnaire shows that most had the very positive view to using stylistic tools in the classroom. Thus, this study highly recommends that teachers of literary subjects should focus on stylistic tools in teaching literary texts.

Keywords: EFL students, literary awareness, pedagogical stylistics, poetry

1. Introduction

The present study presents a technique for teachers of the English language, especially those who teach English literature. Teachers should be empowered with tools and methods in order to teach literary works to foreign learners. Using stylistic tools in learning situations is one of the contemporary movements in the field of stylistics. It is worth noting that creating literary awareness to learn the language of literary texts or to learn the texts in contexts and discourses. Zyngier and Fialho (2010) demonstrate that most teachers assume that learning literature cannot be tested, it is sufficient for a student to learn literature theoretically. Moreover, teachers tend to look into text irrespective to its context or participants. Some stylisticians were aware of this assumption and try to put a systematic way to equip students with stylistic tools that help them to improve their language skills, transferrable intellectual skills, social skills and cognitive skills in literature learning and the students can achieve this by performing classroom activities.

1.1 Pedagogical Stylistics

According to Clark (2007), pedagogical stylistics is a **newly formed activity** that is concerned with teaching stylistics in the **classroom**. It is used to enhance the students' awareness of the language used in their texts. The students



are taught to analyse the text at three levels; the primary level is concerned with analysing the formal properties of the text which include analysing phonology, vocabulary and the syntax of phrases and clauses and also analysing the relationships between sentences, paragraphs. In secondary level, stylistics goes beyond the formal features of the text. It concentrates on the text contact between a text, other texts, and the reader. Students are taught that meaning is not stable, it depends mainly on how the text is interpreted by the reader. In this sense, stylistics has an interactive function. For the third level, stylistics concerned itself with the socio-cultural context within which reading and writing take place. Contextual factors such as the cultural background of the reader and the situation in which a text is read must be taken into consideration when analysing a text (p.60).

1.2 Aims of the Study

The study aims to explore the stylistic techniques in the textbooks to enable students to analyse and interpret poetry as one genre of literature. It also aims at enhancing students' awareness of stylistics as a helpful tool for understanding their literary texts, especially poetic language.

1.3 Limitation of the Study

The study is limited to undergraduate level textbooks prescribed by the department of English at Arts and Science Universities during the academic year 2022-2023. Forty students are randomly selected to take part to be the questionnaire participants of the present study.

2. Method

2.1 Participants and the Procedure

The study was carried out by two steps. The first step is creating documentary analysis and the later one is surveying to the students. Text Books of poems for first year to final year were used. The participants of this study were Second Year English specialization students of Dagon University and Banmaw University. There are altogether 47 students age ranging from 18 to 20 years old. The number of male students is 18 and 29 are female. The students were randomly selected.

3. Results

The data obtained was analysed qualitatively. Each questionnaire was handled separately and the common answers from students were put together to observe an overall attitude. On the basis of the answers of the students, the statement that the students have the positive impact on the use of stylistic tools in studying poems or not is concluded. According to the descriptive statistics, the students had the very positive view on practising stylistic tools in reading poems. They use stylistics to interpret and understand the poetry texts. They were willing to use stylistics to reach to the intended message of the poems.

3.1 Phase 1: Analysing the assigned books of selected poems



The procedure adopted by the researchers has been divided into two steps: The first step is analysing the assigned books of selected poems to find out whether literary awareness exercises are found or not. The researchers used textbooks for first year to fourth year.

Table 1: Examining the prescribed books of selected poems

Table 1 represents the examining the prescribed books of selected poems.

Sr No.	Title and author of the Poem	Questions related to the poem	The main stylistic devices found in poetry				Stylistic tools are used		
			Figures of speech	Parallelism	Foregrounding	Deviation	In understanding literary texts	To what extent they focus on the language of poetry	To reach the rightful interpretation
1	Do You Fear the Wind? Hamlin Garland (1860-1940)	1. What does the wind symbolize in this ode?	<input type="checkbox"/>				<input type="checkbox"/>		
		2. What are the rhyming words in the poem?	<input type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>	
		3. What is the tone of the poem?			<input type="checkbox"/>				<input type="checkbox"/>
		4. Does the poet use imagery?	<input type="checkbox"/>						<input type="checkbox"/>
		5. What figures of speech are used in the poem?	<input type="checkbox"/>						<input type="checkbox"/>
2	The World Is Too Much With Us William	1. Why does the speaker use different types of diction through out the poem?			<input type="checkbox"/>				<input type="checkbox"/>
		2. What is the meter of this poem?	<input type="checkbox"/>					<input type="checkbox"/>	
		3. Why is the speaker dissatisfied with the way that human							



Sr No.	Title and author of the Poem	Questions related to the poem	The main stylistic devices found in poetry				Stylistic tools are used		
			Figures of speech	Parallelism	Foregrounding	Deviation	Understanding literary texts	To what extent they focus on the language of poetry	To reach to the rightful interpretation
	Wordsworth (1770-1850)	beings have been living their way?							
		4. What figures of speech are used in the poem?	<input type="checkbox"/>						
		5. Paraphrase the sentence "Little we see in Nature that is ours?"				<input type="checkbox"/>	<input type="checkbox"/>		
3	Ozymandias Percy Bysshe Shelly (1792-1822)	1. What do you think is the message of this sonnet?	-	-	-	-	-	-	-
		2. What is Shelley communicating, either directly or indirectly, about the nature of power and the passage of time?			<input type="checkbox"/>				<input type="checkbox"/>
		3. Consider the role of interpretation in this sonnet: the sculptor "interprets" Ozymandius in his work; the sculpture is then interpreted by the poet. What meaning can we derive from these on different interpretations display? By giving us these different perspectives, what do you think	<input type="checkbox"/>		<input type="checkbox"/>				<input type="checkbox"/>



Sr No.	Title and author of the Poem	Questions related to the poem	The main stylistic devices found in poetry				Stylistic tools are used		
			Figures of speech	Parallelism	Foregrounding	Deviation	Understanding literary texts	To what extent they focus on the language of poetry	To reach the rightful interpretation
		Shelly is trying to say?							
		4. The sonnet is constructed around a single image. What is that image? How is this image metaphorical? In other words, what deeper ideas or truths does this single image convey?	<input type="checkbox"/>						<input type="checkbox"/>
		5. Is the poem ironic or tragic? What is the irony or tragedy implicit in this poem? Discuss different ways in which the image at the heart of "Ozymandias" is either ironic or tragic (or both), especially in regard to the nature of power.	<input type="checkbox"/>						<input type="checkbox"/>
		6. What literary devices are used in the poem?	<input type="checkbox"/>						<input type="checkbox"/>
4	A Poison Tree William	1. What is the main message in the poem 'A poison tree'?		<input type="checkbox"/>			<input type="checkbox"/>		
		2 What is the symbolism in this poem?							



Sr No.	Title and author of the Poem	Questions related to the poem	The main stylistic devices found in poetry				Stylistic tools are used		
			Figures of speech	Paralle lism	Fore groun ding	Devia tion	Und erst and ing lite rar y text s	To wh at ext ent the y foc us on the lan gu age of po etr y	To re ach to the rig ht ful int erp ret ati on
Blak e (175 7- 827)		3. What is the theme of this poem?							
		4. Give the rhyme scheme and meter of the poem?	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	
		5. How does the meter contribute to the meaning of the poem?	<input type="checkbox"/>				<input type="checkbox"/>		

3.1 Phase 2: Questionnaire Survey

The next step is to distribute a questionnaire to investigate the usefulness of stylistics according to the students' points of view. The participants are forty students from the second-year English major. As a matter of fact, the subject "stylistics" is not assigned for the students at the department of English and they have not much exposed to stylistics. Thus, this study aims at applying the tools of stylistics after introducing the main methods and techniques of stylistics to the students.

In addition to what have been done, a questionnaire was distributed to the students in order to see the effectiveness of using stylistic tools in learning English through reading poetry. Results revealed that most of the students agree that pedagogical stylistics helped them to overcome problems related to meaning and enabled them to focus more on figurative language and understanding the unfamiliar combination of words by knowing the concept of foregrounding. The results also revealed that before introducing students to these concepts they depend on merely the literal meaning of words without paying attention to the poetic creativity and aesthetic elements of the language.

The questionnaire which was distributed to the students contains the following points about stylistics:

- i. Stylistics helps to interpret and analyse poems.



- ii. Stylistics is difficult and misleading; it does not help to analyse poems.
- iii. It makes no difference.

Table 2

Usefulness of stylistics according to the students' points of view

Table 2 shows usefulness of stylistics according to the students' points of view.

Sr No	Statements	Percentage of Students' Choices			Calculation		Interpretation
		No	Not Decided	Yes	Mean	SD	
1	Stylistics helps to interpret and analyse poems.	2%	2%	96%	2.94	0.31	Totally useful
2	Stylistics is difficult and misleading; it does not help to analyse poems.	96%	0%	4%	1.08	0.39	Slightly useful
3	It makes no difference.	98%	0%	2%	1.04	0.28	Slightly useful
Average		65.33%	0.67%	34.00%	1.69	0.95	Moderately useful

NOTE:

1.00-1.66= Slightly useful

1.67-2.33= Moderately useful

2.34-3.00= Totally useful

Data analysis showed that most students are willing to use stylistics to learn poems. Question no.1 “Stylistics helps to interpret and analyses poems” showed the highest frequency. They strongly agreed that stylistics help them understanding the meaning of the poems. The outcomes of question no.2 “Stylistics is difficult and misleading; it does not help to analyze poems” and question no.2 “It makes no difference” showed that they don’t have negative impact on the value of stylistics.

4. Discussion

Data collected through survey showed that English specialization undergraduate students in Myanmar prefer to practice pedagogical stylistics in studying poetry. They have to do exercises based on stylistics tools. Students, however, have to rewrite some sentences or a whole text in another style, or to consider choice of lexis or other paradigmatic choices in paying attention to specific features of language use. Widdowson (1975) proposed that literary criticism is not opposed to stylistics, but on a continuum. Stylistics was seen as particularly valuable as a preparation for literary study but also as of value in itself for students of language use. Literature is of value ‘as a use of language,’ ‘a



particular selection' and 'an arrangement of linguistic forms'. Widdowson (1992) insisted on the importance of 'precision of reference to the text in support of a particular interpretation.

Cook (1986, 1996, and elsewhere) also provocatively argued the distinctive literariness and value of literature in unfashionable, Widdowson mould. He showed in detailed how literature can be appreciated by students using stylistics approaches. Pope (1995) claimed that pedagogically, it is of great importance to note that a stylistics approach is also typically transformative and hands on. Texts must always be related to other texts (McRae,1996). Cook (2000, 2001 and 2004) highlighted wider stylistic work on advertising, promotional discourse and the importance of play in language learning. According to Widdowson (2004), the practical stylistics has become popular in 2004 and later: "there is something distinctive about literature and this calls for a different mode of interpretation and a different kind of critical practice from those relevant to other kinds of language use.

Widdowson (2008), also claimed the context that is the one of language the poem will make rather than a context a reader brings to it; literature is by nature a relatively decontextualized form of communication. According to Widdowson, Carter, and others, pedagogical stylistics made students and teachers a move from facts to skills. Not only literature teachers but also language teachers' pay heed attention to the teachability of such skills and the possibilities for assessment of demonstrable, specific able has abilities with the other texts or unseen texts in exams.

On the whole, pedagogical stylistic tools make students interpret poems easily and to improve their language use and language awareness.

5. Conclusions

This study introduced the techniques of pedagogical stylistics to the students and proved to be of a noticeable importance in terms of bringing the students' attention to crucial elements of the literary language especially poetry. Based on the results collected from pre-test and post-test, it is obvious that students' analyses contain aspects of both aesthetic language and their literary intuition. Finally, most of the students agreed that stylistics is helpful in studying literature. Pedagogical stylistics enabled the students to analyze poems in a systematic way based on textual evidence.

6. Recommendations

According to the obtained results, the following points are recommended:

- a) Teachers of literature are encouraged to use stylistic techniques in teaching literary works. English language and literature teachers are invited to work together to help students to reach a better comprehension of the literary language.
- b) There is also an invitation for the syllabus developers and the minister of higher education to incorporate stylistics as one of the subjects in undergraduate studies.
- c) For researchers to conduct similar research on other genres such as short stories.



- d) Arranging workshops to train both linguistics and literature teachers and expose them to the major concepts of stylistics.
- e) Another research can be conducted for the fourth-year students as part of their teaching practice to examine their ability in teaching poems stylistically. Also, to train them how to teach poems to students using pedagogical stylistics.

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Language Testing and Assessment: A Case Study in Myanmar

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Abstract

In professional settings, assessment refers to a variety of ways collecting information on learners' language ability or achievement, although testing and assessment are often used interchangeably, assessment is an umbrella term for all types of measures used to evaluate students' progress and test are a subcategory of assessment. Several studies have been conducted research about language testing and assessment through a case study method in a qualitative approach. The major aim of the study was to explore a group of English specialization students' perceptions of language assessment or testing based on their understanding of the purpose of language testing or assessment through their experiences and major themes appeared in analysing the short paragraphs written by the undergraduate students about language assessment. The findings of the study reveal that students are aware of the purposes of assessment but their experiences with assessment describe that there are several issues in improving for the effective testing strategies which indicate the area for development in the field of assessment.

Keywords: Language testing, Assessment, Myanmar

1. Introduction

Language testing is the process of using a measuring device created to elicit a particular sample of a person's behavior. A test can also be used to compare a person against others in their age group, educational level, or other similar categories. The teaching and learning of the English language cannot be separated from assessment. Heaton (1975) has defined testing conceiving with teaching as they are inseparable part of each other. He says, "Testing and teaching are so closely interrelated that virtually impossible to work in either field without being constantly concerned with other." Here, he meant that, the teaching is influenced by testing and vice versa. On the other hand, (Khaniya, 2005) has defined test as a process of scrutinizing how far learners have learned what the teacher wishes them to learn. It is defined as "any act of interpreting information about student performance, collected through any of a multitude of means (Brown & Hirschfeld, 2008; Hilao, 2016). The word "testing" is not always used correctly. It describes the specific techniques used by teachers and examiners to attempt to gauge students' language proficiency by looking at what they can demonstrate they know. Language testing and instruction go hand in hand. As a result, testing



and teaching of languages are mutually dependent. This journal provided academics in the field with a suitable platform to discuss their areas of interest. He went on to say that language testing is widely recognized as providing information that helps teachers recognize the impact of their teaching and gain insight into whether to continue or change teaching practices make it more effective. Let's take a look at some definitions by respected scholars. He added that language tests are widely accepted, that they provide useful information for teachers to be aware of the effects of instruction, as well as information on whether to continue or change it to make teaching more effective. Let us observe some of the definitions given by distinguished scholars. "Testing is a means to verify whether the desired goals have been achieved or not. Tests, in language instruction, are a means of measuring the effectiveness of teaching and learning programs, progress and student achievement, i.e. tests that act as a measuring instrument in the education system to test the extent to which learners achieve the subjects taught and the success of instruction. In the past, we liked that the instruction was sufficient to achieve the previously set language teaching goals. After that, the tests are considered mandatory for education.

1.1 Background of the Study

Today, many universities have started teaching language testing as a separate subject. Thus, language is already a separate and independent discipline. Testing has become an international and disciplinary activity. Testing in a broad sense has always been an integral part of education. Assessment is an ongoing process whereby student learning is not only monitored, but also involved in decision-making as to how appropriate the student's abilities are. A test is seen as a natural extension of classroom work, providing teachers and students with useful information that can serve as a basis for improvement. A test can be defined as a method of measuring learners' knowledge to determine their level of development and qualitatively assess how well they have prepared in each area. Today, language testing can be seen as a vivid panorama of testing as an independent subject closely intertwined with teaching and learning.

Language teaching involves both teaching and learning areas. When it comes to teaching and learning, tests are of course part of the problem. This is mainly due to their balancing nature. Teaching without testing and evaluation does not show the effectiveness of teaching and learning activities, testing without teaching has no meaning. Therefore, these terms are related to each other. Therefore, assessment is an ongoing process in language classrooms. Teachers follow several assessment modalities, namely process assessment and summative assessment. Teachers are always looking for success after going through a tutorial. The focus is on the learning process, whereby assessment is continuous and formal while the learner is still learning. As such, assessment is for learning because students are learning. Testing or assessment plays an important role in effective learning and teaching. It can be said that testing has always been an essential part of teaching. Testing and teaching are two inseparable parts of the educational program because without this part would be meaningless. It can almost never be separated.

Assessment is an integral part of learning and teaching English. It is defined as "any act of interpreting information about student learning outcomes,



gathered through one of several means" (Brown & Hirschfeld, 2008). It is a test that gives a clear picture of a student's abilities, identifying strengths and weaknesses in language teaching and learning. Thus, teaching and assessment always go hand in hand, without which it is irrelevant. No one can deny the importance of assessment in a foreign language curriculum. Therefore, assessment is an ongoing process in language classrooms. Teachers follow several assessment modalities, namely process assessment and summative assessment. Teachers are always looking for success after going through a tutorial. Evaluation is the most important part of the teaching and learning process because it is the process by which all elements of teaching and learning are affected.

1.2 Significance of the Study

It is important to know that how students understand assessment affects the quality of their learning. If learners have a false perception of assessment, their learning and that of their peers will not be effective. It is more important because it is associated with daily teaching and learning with the direct participation of teachers. It can promote adaptive learning behavior, when learners feel it provides useful information about their learning needs and progress; however, it can lead to maladaptive behavior if learners fail to see its relevance to their learning and development (Brown, 2004). From this perspective, it seems reasonable to argue that learners' behavior before, during, and after assessment depends on how they perceive assessment (Segers, Dochy, & Cascallar, 2006).

Therefore, understanding students' perceptions of assessment is important. Research is needed to determine what the assessment means for learners. Such studies can provide valuable information on the foundation of which more effective activities and teaching plans can be implemented. Therefore, this study is crucial because it is hoped that findings will provide useful suggestions for teachers, schools, parents and other stakeholders in the field of education.

1.3 Objective and Research Questions

The main objective of the study was to explore the perceptions of a group of graduate students about language assessment or testing. More specifically, the following research questions are addressed:

- i) What do graduate students understand about the purpose of a language test or assessment based on their experience?
- ii) What major themes emerge from the analysis of short passages written by graduate students on language assessment?

2. Review of Related Literature

A number of research-related language test skills have been conducted in the relevant literature. Rubin, Daly, McCroskey, and Mead (1982) found that well-controlled assessment practices can have desirable effects on teachers' educational performance, and that test scores have progressive functions in student learning suggesting that it is possible. A study by Brown (2004) used confirmatory factor analysis (CFA) to examine the appraisal beliefs of 760 Iranian



university students. The results showed that students had both positive and negative thoughts about assessment. They viewed it as improving both learning and teaching and as a hindrance to learner development. However, others (Khaniya, 2005) argue that there are many reasons, such as the use of local and national languages in English classrooms, the educational policy of the country and the environment, schools, affecting foreign language teaching and learning languages including English.

Brown and Hirschfeld (2008) studied secondary school students (n=3469) conducted structural equation modeling (SEM) to understand assessment in New Zealand. He reported that lower reading achievement scores were predicted for non-majority, male students, who viewed assessment as a measure of school accountability, who omitted assessment and those who consider reviews a pleasure. Research results indicate that most students have a negative view of assessment and are dissatisfied with inadequate feedback from their teachers. However, they agreed that the feedback helped their learning. Diwadi, (2018) conducted interviews with English teachers in Myanmar to find out whether testing listening and speaking skills in exams has a strong relationship with their motivation to learn English.

Similarly, Razavipour and Rezagah (2018) conducted focus group discussions with four teachers and also reviewed several teacher-built tests. Their results indicate that (i) teachers are not in charge of reform, (ii) schools lack adequate resources, (iii) accountability requirements have led to grade inflation, and (iv) teachers Staff members tend not to be able to consistently evaluate with the Language of Needs Assessment Reform (LAR). Specifically, Razavipour and Rezagah (2018) find that teachers seem uncertain about what and why they evaluate; Teachers also have difficulty aligning their assessment activities with the principles of communicative language instruction. These results point to the need to develop language assessment skills of language teachers to ensure that they understand the idea of reforming language assessment and to provide flexibility in ways to adapt to different environments access field.

The related literature reviews mentioned above illustrate that studies on test design or assessment of language learners still need to be improved in the context of Myanmar. Furthermore, most of the previous studies followed quantitative methods. He will be able to contribute to this with an emphasis on qualitative research to effectively describe test cases or evaluate language.

3. Methods

The researcher conducted a case study, the data were collected and analyzed using qualitative research methods. In this section, the researcher described the participants and the method of data collection and analysis.

3.1 Participants of the Study

An intact group of second-year British master's and doctoral students were selected as study participants, including 7 English majors. Most of them are women (n=7). They represent different regions of the country; these students have enrolled in a degree course in the field of language teaching. All students are



full-time students. Most of the participants were unemployed and dependent on their parents to cover the cost of living in the country's capital.

Table (1). Background information of participants

Total Numbers of participants	Gender		Educational qualification	
	Male	Female	M.A (English)	Ph.D. (English)
7	1	6	5	2

3.2 Data Collection

Data were collected from an intact group of graduate students enrolled in a language instruction course. Participants performed the first task in the first week. The task prompted the participant to complete the tasks. They were tasked with writing a two-part paragraph about how they viewed the teacher's assessment and about their experience with it. In related literature, responses have been analyzed by previous researchers to uncover individuals' thoughts on an assessment, including their experiences. In this study, responses were collected and analyzed

From the purpose of cognitive exploration of language testing and assessment. The second topic was experience-related in which they presented their own personal experiences with language assessment. Participants had one day to complete this task. They read sample stories related to English language assessment. It is collected and analyzed based on their experience of the Final language assessment; The data collected consisted of 7 sample experiments written by the participants.

Table (2). Theme 1: Purpose about the assessment performed by the students (n=7)

N	Statements	Disagree %	Agree %	Mean	SD	Interpretation
a.	Assessment and learning process; although, it is often disliked by most students, testing is an essential part of teaching.	33.33%	66.67%	1.67	0.47	Positive
b.	Tests also motivate students to overlearn and internalize the material and can also guide stakeholders, which may happen in different ways.	33.33%	66.67%	1.67	0.47	Positive
c.	Assessment significantly influences their approaches to learning and studying.	50%	50%	1.50	0.50	Negative
d.	Assessment sometimes may have a negative effect.	50%	50%	1.50	0.50	Negative



N	Statements	Disagree %	Agree %	Mean	SD	Interpretation
e.	Careless implementation of assessments may have negative consequences.	50%	50%	1.50	0.50	Negative

NOTE

1.00-1.50=Negative

1.51-2.00=Positive

Five sample statements are mentioned in the questionnaire including positive and negative perspectives. Assessment and learning process, although generally disliked by most students, testing is an essential part of education. Testing can also motivate students to over-learn and master the material, guiding stakeholders who can do so in a variety of ways. It seems that the participants disagree with the rest of other statements (Mean=1.67).

Table (3): Theme 2: Major themes emerge from the analysis of short passages written by graduate students on language assessment (n=7)

SN	Statements	Disagree %	Agree %	Mean	S.D	Interpretation
a.	The way learners consider assessment determines their final achievement.	33.33%	66.67%	1.67	0.47	Positive
b.	Assessment is one of the cheating, anxiety, and prejudice, and also not able to function as a means that promotes collaboration and improvement.	66.67%	33.33%	1.33	0.47	Negative
c.	There are several issues in improving for the effective testing strategies which indicate the room for improvement in the field of assessment.	66.67%	33.33%	1.33	0.47	Negative
d.	Feedback encouraged our learning effective.	66.67%	33.33%	1.33	0.47	Negative



SN	Statements	Disagree %	Agree %	Mean	S.D	Interpretation
e.	Formative assessment described for particular areas of difficulty faced by learners.	50%	50%	1.50	0.50	Negative

NOTE

1.00-1.50=Negative

1.51-2.00=Positive

The questionnaire contains five sample statements with positive and negative points of view.

According to the table interpretation, a learner's attitude toward assessment determines their final grade (Mean=1.67). As for the rest of the statement, it appears that the participants did not agree.

3.3 Data Analysis

The data was analyzed qualitatively through thematic analysis. To analyze the perception and answer the first research question, the deductive coding method was applied. The responses were analyzed based on Fulcher (2013), who outlined four general goals for language testing: Testing is done to control, empower, motivate and guide. In addition to helping organizations monitor policies, employment, admissions, and more, tests can also be used to empower or create equity in the community. The tests are administered to the entire population and only the best performers have the opportunity to continue their studies. Two topics are covered related to English language assessment. These are (1) student perception of assessment and (2) assessment experience. Tests also push students to over-study and absorb the material. Finally, testing can also guide stakeholders, which can be done in four different ways. First, testing can provide useful information that helps decision-makers choose the right person for the right job. Second, suitable people can be placed in classes at different levels based on their performance on placement tests. Third, tests can also show what a learner has achieved after a single treatment.

Finally, tests can also help teachers diagnose specific needs and areas of difficulty for learners. It is clear that the role of the test is indispensable in education, business, politics, law, linguistics, etc. This information provides researchers with a useful analytical framework in which responses written by participants can be analyzed and classified. In addition, this study also aimed to investigate the experiences of the participants in language assessment by analyzing short passages and their stories. It has been through inductive code to achieve the purpose. Researchers read stories and passages and interpret them into themes. Topics are coded according to the participants' experiences. Next,



identify stories and paragraphs with similar themes and the results show the frequency of occurrence of each topic in all stories and paragraphs.

3.4 Results

It is important to explore learners' perceptions of language testing and assessment. In the current study, a group of post graduate students' conception of language assessment was investigated via the analysis of their opinion. In this research, findings reveal that students' perceptions about assessment which is a way of supporting learning. It helps teachers, learners, parents and other to understand the depth and breadth of learning undertaken so that progress and next steps can be discussed and planned. Assessment plays a critical role in education. Summative and formative are a pair of terms used to describe contrasting approaches to assessment. But when it comes to choosing an assessment type, there are no right or wrong answers. It is all about what to be measured. The findings demonstrated that a system of well-constructed assessments allows students to demonstrate their abilities and knowledge and then reflects how close they are to meet educational goals and standards. Evidence from assessments can be directly beneficial to students. In general, post graduate students had a tendency to conceive as a means to know how much students have learned by the use of traditional forms of assessment. Such understandings are potentially influenced by the students' backgrounds and contexts.

The results of this study might start further discussion on the field of assessment and help as a point of reference to examine how English teachers' conceptions of assessment can potentially impact teaching and learning processes. In general, post graduate students had a trend to consider assessment as a means to know how much students have learned by the use of traditional forms of assessment. Such understandings are theoretically influenced by the students' backgrounds and contexts. This finding might show that the participants focused their assessment understandings on the leading role of teachers and on what is stated in the syllabus. The quality of education and transfer of knowledge, attitude and skills were affected as a result of lack of implementing appropriate assessment methods. So, these issues need special attention and follow up to solve these problems. A key principle of feedback is that it will usefully inform the student about the ways to improve their performance for the future. Studies showed that assessment is one of the most important activities of education institutions. This study revealed some important findings that can be used as an input practice of assessment for learning and teaching in Myanmar.

4. Discussion

In the current study, a group of students' conceptions of language assessment was investigated via the analysis of their paragraphs and short stories. As the analysis of the paragraphs showed, the participants in the current study covered all the purposes outlined by Fulcher (2013) especially in the field of language education. Therefore, it is easy to conclude that these participants are not completely aware of the purposes of language assessment. One possible reason could be these participants' relatively low assessment literacy as students of English Language Education. Another explanation for the participants' ideas on



assessment could be noted that the students form multiple backgrounds (community and institutional background), educational, cultural, geographical issues to reflect the experiences teaching and assessing English as a second or foreign language by the teachers at the campus. It can be inferred from this result that the participants come from different backgrounds in which assessment is conceived as a testing rather than a learning tool. The results also are in line with the themes which emerged from most of the paragraphs in which assessment as one of the cheating, anxiety, and prejudice, and also not able to function as a means that promotes collaboration and improvement. The results also corroborated those of Tong and Adamson (2015) survey in Hong Kong, who reported students' negative conceptions of and dissatisfaction with assessment practices in their respective educational system. In the present study, the respondents also agreed that feedback encouraged in their learning effectively. The analysis of the paragraph in my study also indicated the usefulness of formative and formative assessment which described for particular areas of difficulty faced by learners. The responses about the paragraphs and its analysis showed that some responses created by the participants presented negative conceptions toward assessment. On the other hand, as the paragraph data indicated, some of the paragraphs represented negative themes about testing and assessment. There are some reasons the participants could not notice to ongoing testing practices rather they represented the possible explanation which could be the effect of the language testing course that the participants were experiencing. As the course continued, they gained better understanding of assessment and how far assessment practices that they had experienced were far from ideal in their academic journey. Therefore, their views toward assessment practices varied from one batch to next and could have become more critical about the way assessment is typically practiced in their communities.

5. Conclusion

The objective of the present study was to explore a group of students' conceptions of language assessment by analysing a paragraph that they wrote about assessment individually. Based on the analysis of the paragraph written by the participants of this study, it was found that assessment is beneficial for teachers guide, motivate, control, and empower their learners. They viewed assessment as a means of accountability and improvement, it often encouraged for adaptive behaviour in learners and supported in their learning. We can understand from the results that very few participants considered assessment an empowering tool. This implies that steps need to be taken to promote assessment for effective learning knowing the assessment that learners' perceptions change about assessment and more learners understand assessment as a tool in service of learning. The results of analysis of paragraphs lead us to conclude that formative and summative forms of assessments or tests can result for the manipulative behaviours in language learning. Again, according to paragraphs, assessment motivated and emphasized for effective learning. This suggested that the cooperation with community regarding the drop out of the students. More



support should be provided by the educational systems for the community to deal with its misconception of failure.

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Influence of Professional Development on Teachers' Performance and Career Progression

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Abstract

Professional development refers to continuing education and career training after a person has entered the workforce in order to help them develop new skills, stay up to date on current trends, and advance their career. In this study, the author intends to explore the relationship between a university environment and teachers' readiness for PD as well as how they perceive of the impact of PD on their professional and personal qualities, teachers' career progression, and commitment to the job and workplace. The study employed convergent parallel design under the mixed methods approach to help collect and analyse both quantitative and qualitative data strands. So, the author administered questionnaire and semi-structured interviews with English teachers who are in their mid-career stage. The quantitative data was analysed with the aid of Statistical Package for Social Sciences (SPSS) while qualitative data were analysed through a thematic color-coding manual analysis and thematic analysis of the specific objectives. The results show that how a progressive university culture would impact teachers' preference towards PD has also been brought to attention by the interviewees as a critical aspect. According to the findings, formal PD tends to have successfully taken place in universities followed by informal and differentiated PD. Moreover, all interviewees admit the positive impact of PD on their professional performance, personal qualities, career progression and commitment to the profession.

Keywords: Professional development, Teachers' Performance, Career Progression, Mid-career stage

1. Introduction

Professional development has been defined in various ways by different scholars. Professional development is learning to earn or maintain professional credentials such as academic degrees to formal coursework,



attending conferences, and informal learning opportunities situated in practice. It has been described as intensive and collaborative, ideally incorporating an evaluative stage. There is a variety of approaches to professional development, including consultation, coaching, communities of practice, lesson study, mentoring, reflective supervision and technical assistance. In the educational field, research has shown that university leadership and teaching quality are the main contributing factors in boosting student achievement. University leaders continually strive to bring about and implement the best educational practices and professional development is the main strategy through which university systems bolster teachers' performance levels. McIntyre, Hobson, and Mitchell (2009) claimed that successful PD tends to take place in universities with a culture focused on the learning of staff as well as students.

Teacher professionalism is defined as the knowledge, skills, and practices that teachers must have in order to be effective educators. Teacher professionalism is said to be deeply intertwined with their professional identity and beliefs about the requirements of being a good teacher. Describing a professional as a trained, qualified expert who demonstrates practical competence was induced by Leung (2009). Teaching is a noble profession that comes with so much responsibility and duty towards students. Teachers do not only teach and impart knowledge but inspire and motivate students for life and take important steps in life. They keep working to boost the confidence of students and direct them in the right direction. By tenacious learning, teachers' professional degree and performance can be enhanced; professional qualifications are socially and politically viewed as powerful indicators of teacher professionalism (Leung, 2009). Teachers' PD refers to the re-establishment, development, and expansion of teachers' knowledge and skills. Innovation in teachers' professional development involves teachers' practical experience and the formation of instructional strategies that allow students to gain autonomous, reflective, and critical thinking skills. PD is said to be a cognitive and personal attempt that requires engagement with new ideas, trying new approaches, improving pedagogy as well as emotional involvement (Girvan, Conneely & Tangney, 2016).

1.1. Formal, Informal, and Differentiated PD

Richter, Kunter, Klusmann, Lüdtke, and Baumert (2011) defined formal PD as structured learning environments where experts impart knowledge to teachers to help them sharpen their skills, e.g., training courses, workshops, and conferences. They referred to informal PD as those activities that comprise no specific curriculum, nor they mandate a particular environment. Informal PD includes individual activities on the part of the teachers, e.g., reading narratives of colleagues, observing classes, contributing to joint activities such as teachers' networks, blogs, and study groups. More to the point, empirical studies showed that novice teachers tend to use observations and informal discussions with peers to improve their practices, while more experienced teachers tend to participate in more formal meetings for their professional learning. In literature, PD refers to both formal and informal learning activities specifically designed to enhance teachers' professional knowledge, capabilities, competence, motivation, self-



efficacy, and beliefs (Coldwell, 2017). Avalos' study (2011) pointed out that teachers in their early "survival and discovery" (p. 118) years usually report problems with class management and effective teaching approaches; such issues can be resolved through mentoring and peer observation as well as other informal means of exchanging practical knowledge. In contrast, teachers pursue more formal learning opportunities as they grow towards their mid-career phase. Mid-career teachers tend to gain more professional knowledge in the areas of subject content, pedagogy, teaching methods, and performance standards through formal activities such as conferences, workshops, and training courses. Mid-career teachers are a large group of teachers for whom traditional staff development is not working. This group can be defined as having 15-31 years of teaching experience, and an age range from 35-55 years. Generally, teachers seem to have different preferences for their learning opportunities across their career cycle.

It was also mentioned in the related body of literature that providing that type of differentiated and responsive support to meet teachers' learning needs could lend a helping hand to enhancing teachers' professional commitment (Day & Gu, 2007). Taylor, Yates, Meyer, and Kinsella (2011) mentioned that teachers' PD does not necessarily acknowledge the fact that teachers are not a homogeneous population and that they rather represent diverse perspectives, experience, expertise, receptiveness to new ideas, as well as the potential for leadership roles. PD cannot be considered a generic or a one-size-fits-all model; teachers' needs, experience, career stage, beliefs, students, and school context should be taken into consideration. Professional learning should begin with instigating reflection on teachers' needs and demands instead of imposing unified PD opportunities (Tait-McCutcheon & Drake, 2016). Taylor et al. (2011) advocated differentiated PD for teachers based on their level of experience and expertise; it was noticed that granting teachers the chance to choose the type of PD they need enhances their self-efficacy and pedagogical knowledge.

1.2. Professional Development and University Culture

Desimone (2009) pinpointed university leadership as a contextual factor and supportive school culture as particularly central to organizational learning. Avalos (2011) contended that professional development is not only about how teachers learn, but also how they transform their knowledge into practice for the maximum benefit of their students. Teachers' PD is a complex process that entails cognitive and emotional involvement of teachers, and the capacity and readiness to examine one's convictions and beliefs and to explore the available alternatives for improvement; this necessitates particular educational environments or school cultures that are permissive and conducive to learning. Different studies referred to university culture as an indicator of the university's philosophy and attitude. This notion implies how the administrative and organizational structures operate and interact to enhance or restrict teachers' workplace learning. University traditions, mission, vision, and administrative arrangements influence how teachers appreciate their work and how they interact professionally among themselves. Various subject departments that are seen as forms of the university organization can have positive effects on teacher professional growth and active pedagogic leadership (Avalos, 2011). The impact of a supportive and



development-focused organizational culture on teachers' dedication to PD was further stressed in Chang, Yeh, Chen, and Hsiao's study (2011). The study suggested that teachers who actively participate in PD "would benefit from pleasant and harmonious workplaces" (p. 169), varied learning opportunities, and motivation to learn from peer experiences which all contribute to workplace learning. Workplace learning is defined as all formal, informal, individual, and collaborative PD that takes place in university. A supportive organizational learning environment can enhance teachers' intelligence, self-confidence, and self-efficacy (Avalos, 2011).

1.3 The Impact of PD on Teachers' Performance

Desimone, Porter, Garet, Yoon, and Birman (2002) averred that PD and ongoing learning opportunities were found to have enhanced teachers' instruction and classroom practices. They confirmed that PD is a cornerstone in deepening teachers' subject knowledge and increasing their "capacity to teach to high standards" (p. 81).

Teacher professional development often involves reciprocal sharing of ideas, experiences, and active participation in problem-solving activities. Many study results demonstrated the positive impact of PD on teachers' knowledge and practices. Professional development was said to have improved teachers' curricular knowledge and understanding in academic areas like reading comprehension, and in some social areas such as encouraging students' learning. Improvement in teachers' knowledge contributed to their increased self-satisfaction and self-efficacy (Avalos, 2011). Coldwell (2017) argued that international research linked teacher PD with higher teacher efficacy. He added that teachers' increased knowledge as a result of PD enabled them to feel more confident and motivated as effective educators. Coldwell's participants contended that PD had also helped them demonstrate their distinctive skills and attributes. Knowledge, confidence, and motivation were seen to be closely related to self-efficacy. Furthermore, some of the teachers who participated in Coldwell's study asserted that taking part in PD increased their confidence which in turn led to the validation of their content knowledge. Other teachers claimed to have become so confident that they started applying for promotions. Many of Coldwell's subjects discussed other 'mediating outcomes' such as improved classroom practices and increased job satisfaction.

2. Aim of the Research

This study aims to explore teachers' insights into the impact of PD on their teaching abilities, knowledge, and career advancement is pivotal to gaining a comprehensive understanding of the existent as well as the potential obstacles teachers might face. The author feels compelled to find out how the university culture impacts on teachers' professional development and the relation between PD teachers' progression. Thus, the present study is meant to seek answers for the following questions:

1. How does university culture enhance teachers' professional development?



2. Is there any relationship between PD and teachers' commitment and career progression?

Through answering the research questions, the study in hand will add some empirical knowledge on PD to the existent body of literature; examining how PD systems work at some universities and whether they accomplish their purposes as intended or not from a more practical viewpoint is still needed in order to illuminate the issues at stake.

3. Methodology

Methodology describes the methods applied in this study in order to grab the desired answers to the research questions.

3.1. Participants and Sampling

The participants in the current study are English Language teachers who work for English departments at universities. The aim of many qualitative studies "is not to generalize but rather to provide a rich, contextualized understanding of some aspects of human experience through the intensive study of particular cases." Hence, the results of this study are not meant to be generalized, but to present practical knowledge to the existent body of literature. (Polit & Beck, 2010, p. 1451).

3.2. Data Collection

Semi-structured interviews were chosen as the only data collection methods for the study in hand. Kvale (2008) defines a semi-structured interview as a purposeful everyday conversation that involves a certain technique; in general, interviews provide high quality data and adaptability is one of their major strengths (Drever, 2003). The tools a researcher utilizes in observing, measuring and making sense of the surrounding world determine their productivity (Fraenkel, Wallen, & Hyun, 2012).

3.3. Procedures

Questionnaire and informal, individual, face-to-face semi-structured interviews were conducted with all interviewees. The interviews took place in an informal setting for its adjustability to the individual context and situation to help the interviewees give their true feelings without having to bear any consequences (Christensen, 1980). Informality is prioritized when personal, complex, or sensitive issues such as disagreement with organizational policy are tackled (Hannabuss, 1996). The interviews were individually administered to allow the researcher to lead the discussion easily in the desired direction and create an atmosphere of discretion that helped the respondents to discuss their personal views openly. Face-to-face interviews were considered more convenient in terms of observing the teachers' non-verbal responses, e.g., body language, tone, hesitation, and facial expressions (Bell, 2005).

4. Results

In conducting the questionnaire as well as interview surveys, the teachers were asked which PD types they prefer: Formal PD, Informal PD or Differentiated



PD. The responses of the teachers are calculated in percentage, and mean and SD are tabulated to have vivid interpretation. For the teacher interviews, three main themes were set to be asked: whether the teachers are able to share their experience and knowledge, and participate in activities, whether they gain curriculum knowledge and academic areas, and whether they get self-satisfaction and self-efficacy in contributing the knowledge.

4.1. Quantitative Data

The main instruments used for the purpose of data collection are a questionnaire as well as a semi-structure interview. The interviewees were asked to tell their preferred PD type among the three types: Formal PD, Informal PD or Differentiated PD. The quantitative data from the questionnaire were analysed using descriptive statistics and shown with mean and SD to better understand the respondents' answers.

Table 1
Participants' responses towards Professional Development Types

Sr No.	Formal PD	Informal PD	Differentiated PD	Mean	SD	Interpretation
1.	84.62%	11.54%	3.85%	1.19	0.48	Low level

NOTE:

1.00-1.66=Low level

1.67-2.33=Moderate level

2.34-3.00=High level

The table above shows the participants' responses towards Professional Development types in percentage, mean score and SD. Formal PD is preferred the most with 84.62% which is followed by Informal PD (11.54%) and Differentiated PD (3.85%) respectively. It is clearly seen that majority of the university teachers in Myanmar are influenced by formal PD. The average mean score generally interprets low level which means that the majority of the teachers has low exposure to PD. Therefore, the Ministry of Education of Myanmar is encouraging the teachers in Myanmar to do more PD in order to update and upgrade their skills and knowledge required with the purpose of quality education.

4.2. Qualitative Data

All interviews were transcribed, color-coded, and manually analysed. Transcribing qualitative data granted the author the initial reduction opportunity to settle on information relevant to the study. A thematic color-coding, manual analysis then took place based on discussed themes. Interviewees were given pseudonyms to reach confidentiality of identities.



Table 2

Interview responses of the teacher participants towards a variety of aspects connected to the Teachers' Professional Development

Sr. No.	Sample Responses
1.	<p>Interviewee 1</p> <p><i>When I was first appointed as an English tutor at this university, I had to attend training course arranged by the university for professional development. I got the opportunity to learn effective ways of teaching and understand pedagogy.</i></p>
2.	<p>Interviewee 2</p> <p><i>In my workplace, we are often urged to attend conferences and workshop to share our knowledge and experience on teaching. We often target a specific area of growth to enhance through a suitable PD session. And, it really saves time in understanding the course as well as the students.</i></p>
3.	<p>Interviewee 3</p> <p><i>Well, in our time, we were not allowed to teach or enter a class until we had almost 5 to 6 years of service. What we had to do was that we had to do classroom observations. We had to follow our senior experienced teachers and observed their classes: how they taught their lessons and managed the classrooms. So, we first had to absorb practical classroom-related knowledge as well as subject matters from our senior experienced teachers.</i></p>
4.	<p>Interviewee 4</p> <p><i>I still remember when I was fresh tutor at this university, I was given advanced PD workshops on teaching methodologies and pedagogy which made me think teaching is hard and the more important part is to understand students. I guess PD workshops must be offered in stages that suit both novice and expert teachers and meet their different needs. I believe teachers' knowledge varies depending on our years of experience and background. Later, I started to observe classes taught by senior teachers and felt relaxed. I began to enjoy my profession as a teacher. My suggest is informal PD should be given first to the novice teachers.</i></p>
5.	<p>Interviewee 5</p> <p><i>In my opinion, I enjoyed the training course given by the university when I first became a teacher because that training taught me the importance of understanding the knowledge on subject matters as well as understanding the students. I became aware of the skills and techniques on how to teach students effectively and understand their situation.</i></p>
6.	<p>Interview 6</p> <p><i>I believe attending workshop and conference has made me become better at planning my lessons according to the time limitation. These workshops and training really give knowledge on curriculum as well as academic processes. And, I feel more self-satisfied and have more self-efficacy.</i></p>



Sr. No.	Sample Responses
7.	<p>Interviewee 7</p> <p><i>I believe giving training course and having workshop to all teachers is good but there has to be different range as the teachers are of different teaching experience and years of service. I do not find it a good idea giving the same level of training to both the novice teachers and experienced teachers at the same time. Their actual needs should be addressed and trained according to their pedagogy-related PD. They should be trained to fill where they are lack of.</i></p>
8.	<p>Interviewee 8</p> <p><i>Because of training and conference, I got to know lots of knowledge on curriculum and academic areas. These training and conference have tremendous amount of positive effect to my profession.</i></p>
9.	<p>Interview 9</p> <p><i>As soon as I started to prioritize PD, I started to feel satisfied in my teaching career and I believe I have understood my subject matter better and have self-efficacy.</i></p>
10.	<p>Interviewee 10</p> <p><i>When we attend workshop and conference, we get the opportunity to share our experience and knowledge on teaching as well as our difficulties we face while teaching a specific topic, and find for different solutions. I believe it does have positive effect on my profession of teaching.</i></p>

As shown in table 2, it is found that Myanmar teachers have their conscious and deliberate awareness that PD plays a significant role in sharpening their capacities and updating their knowledge and skills. It gives them the desire to develop their careers and to see positive outcomes through PD. The students have gained enough knowledge on curriculum and academic areas because of PD. Most importantly, it is found that teachers started to feel self-satisfied and have high self-efficacy as long as they are connected to PD.

5. Discussions

According to Humammed (2011), Professional Development is about teachers learning, learning how to learn, and transforming their knowledge into practice for the benefit of their student's growth. Teacher professional development is a life-long and continuous process in which teachers are expected to upgrade their knowledge, master new skills and change their practices. To meet their needs in their profession, various kinds of trainings and workshops are provided to teachers in order to upgrade their skills and knowledge which consequently update and uplift the quality of education. Moreover, university culture and administrative arrangement influence how teachers appreciate their work and PD. Tantawy.N (2020) showed in his research that all the interviewees admit the positive influence of PD on their professional performance, personal qualities, students' outcomes, career progression and commitment to the profession. How a



progressive school culture would impact teachers' inclination towards PD has also been brought to attention by the interviewees as a critical aspect. As far as the research is concerned, PD is valued as an effective tool that contributes to raising the level of teachers' performance and confidence, content knowledge, awareness of trendy classroom strategies and teaching methodologies, classroom management skills and commitment. The finding has shown that PD sessions can be attributed to their deliberate cognizance of the significance of PD in teachers' professional life. The interviewees have also shown preference for more formal PD types: conference, training course, workshops compared to other PD types. The teachers also presented that lots of professional and personal qualities have been instilled in them through PD such as self-efficacy, motivation, classroom management skills, developed content knowledge, confidence and has enhanced teaching methodologies. It is shown that the majority of the teachers had participated in the in-service training courses given by the university that equipped them with the necessary knowledge and skills. It is also found that training teachers with knowledge and skills influence their performance by empowering them with knowledge and skills required for quality education. And, those training courses and workshops are mostly arranged by the university heads and administrators. Therefore, it is concluded that university culture has positively affected on the teachers' professional development. And, those who are doing PD have more confidence, more satisfaction and more self-efficacy towards their profession and career which brings commitment and progression. These instilled value and qualities bring healthy and friendly teaching environment to the teachers which means PD and teachers' commitment and career progression are closely related to each other.

6. Conclusion

The aim of the study is to find out the influence of professional development on teachers' performance and career progression which has been achieved and the research questions have been thoroughly answered through administered interviews. The study concluded that PD plays a greater role on teachers' job performance and commitment towards work. It is a need for continuous training for university teachers. It is found that formal PD is mostly preferred and most of the training courses, workshops and conferences for the teachers are arranged by the university. Therefore, it is found that university culture has positively influenced teachers' professional development and enhance it into another level. Teachers who are given PD trainings are found to have more satisfaction, more self-efficacy and more confidence. The teachers' increased knowledge and skills gained through PD make them feel more confident and motivated as effective and reliable teachers. Therefore, it is concluded that PD and teachers' commitment and career progression are closely related.

7. Recommendations

Based on the findings of this study, a number of recommendations have been made. Ministry of Higher Education, Myanmar should give more in-service trainings and workshops for teachers as well as organize and facilitate in-service trainings and seminars. Moreover, PD experts should not regard teachers as a



homogenous group but rather a diverse one in terms of experience, background, knowledge, and potential for their career and progression. In addition, heads and administrators of universities should make sure they disseminate timely information regarding national, regional and local in-service training for the teachers as well as make sure that teachers attend such programs. On the other hand, they should take adequate measures to ensure that the newly employed teaching staffs are given proper and adequate orientation, induction and in-service training to enhance their productivity and make quality education.

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Guide me please!

EFL Student Teachers' Perceptions of their Teaching Practice from a Yemeni University

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Abstract

Understanding the perceptions of student teachers of English as a Foreign Language (EFL) is essential to approach and improve their practices. This study aims to explore EFL student teachers' perceptions of their teaching practice that they have experienced before graduating from a teacher education programme in Yemen. It investigates their perceptions on teaching practice in general, including supervision by their cooperating teachers, university supervisors, and the host schools. The study employs a quantitative approach to collect and analyze the data. The data were collected using a five-Likert scale questionnaire. The findings show that student teachers are dissatisfied with their teaching practice experience. They also indicate that the supervisory visits and guidance are limited to provide the student teachers with frequent and valuable feedback for their teaching practice. Based on the findings, some implications and recommendations have been offered for EFL teacher education programmes administrators and



policymakers, particularly in Yemen and other similar teaching and learning contexts.

Keywords: Perceptions, practicum, student teachers, supervision, teaching practice.

1. Introduction

Teaching practicum is considered an essential learning experience for novice teachers (Canh, 2014; Darling-Hammond, 2000; Richards & Crookes, 1988). Teachers are expected to acquire and develop purposeful and scientific experience during their preparation through teacher education programmes. This experience may help students develop their own potentials, pedagogical skills, and competencies to professionally perform their roles as teachers in the future (Cheng, Cheng, & Tang, 2010; Endeley, 2014; Wambugu, 2013). Thus, novice teachers or as they are called student teachers in this study, should be able to cope with issues they might encounter during their teaching practice (Cheng et al., 2010). Taking this practical stage into account is necessary for the student teachers' effective learning as it unveils areas of discord between what they are expected to do, and what they actually do in their teaching practice. Therefore, investigation into the perceptions of and understanding the encountered issues could lead to better teacher preparation (Goh & Matthews, 2011; Mukeredzi & Mandrona, 2013). It could also lead to a better approach and improvement their teaching practice experience (Lawson, Çakmak, Gündüz, & Busher, 2015).

2. Literature Review

Teaching practicum, also called teaching practice by some scholars (Canh, 2014; Farrell, 2008; Hyland & Lo, 2006; Kabilan, 2013; Moody, 2009; Merç, 2015) is the first step where student teachers gain practical classroom experience. During this stage, they are trained to apply and implement theoretical and teaching ideas professionally (Gebhard, 2009) under the guidance of experienced supervisors (Mukeredzi & Mandrona, 2013).

Literature asserts the importance of supervision to assist student teachers to translate what they have learned in their theory classes into practice for the purpose of improving their professional performance (Farrell, 2007; Richards & Crookes, 1988; Wallace, 1991). In any teacher education programme, cooperation among all members concerned is required. Higher learning institutions have a fundamental role in preparing student teachers to deal with classroom needs and realities, to know and practice teaching methods, and to master the subject matter (Tuli, 2009). Villers and Mackisack (2011) argue that establishing collaborative relationships between school and university staff would help to bridge the perceived gap between the academic and the practical aspects of initial teacher education. Therefore, it is important for teacher education programmes to establish and strengthen collaborative professional relationships between university supervisors and school teachers. This could help to generate, endorse, and sustain the various forms of knowledge, skills, and understanding which could eventually contribute to the student teachers' teaching. There should be relationships between the supervisors and the cooperating teachers whom, are considered to be the secret behind the success of the teaching practice experience



(Richards & Crooke, 1988). Establishing such relationships “affords guidance to the cooperating teachers as they serve as models for the student teachers” (Cahn, 2014, p. 219). They are not only subject matter experts and focus on pedagogical strategies for teaching a particular discipline. But they need also to involve student teachers participate in content-area seminars and attend departmental meetings and in-service activities at school. It is better for student teachers to work with a number of experienced teachers and have access to all teachers in the department rather than being isolated with only one teacher. (Wallace, 1991).

The cooperating teachers play an essential role in the student teachers’ teaching practice. They are generally accepted by student teachers and other teachers to be “the most powerful influence on the quality of the student teaching experience and often shape what student teachers learn by the way they mentor” (Weiss and Weiss, 2001, p. 134). Cooperating teachers spend so much time with student teachers and are available to give advice during the practicum period (Farrell, 2008). They can also assist the student teachers to link the theory with practice (Kecik & Aydin, 2011). In addition, cooperating teachers can observe, record, and report on the student teachers’ progress and application of their knowledge (Borko & Mayfield, 1995). They are also their advisors and facilitators at schools. Further, they get to arrange and elucidate the understanding that the student teachers acquired from their teaching practices (Clarke, Triggs, & Nielsen, 2013).

Likewise, university supervisors play fundamental roles to ensure the teaching quality of student teachers. They are supposed to observe and evaluate the student teachers’ pedagogical skills and provide feedback essential for their professional development. However, feedback should not be limited to the lessons observed and disconnected from other lessons. It should be extended and cyclical to address pedagogical issues faced in school (Asmawi, 2016). Furthermore, university supervisors have other roles in assessing and giving grades for student teachers’ performance (Haciomeroglu, 2013) at the end of practicum.

Research has shown the effectiveness of quality supervision on the student teachers’ teaching practice performance. For example, Kourieos (2012) applied a qualitative case study to identify the impact mentoring had on student teachers’ learning to teach during practicum. In his study, fourteen student teachers studying at a private university in Cyprus were interviewed. The results emphasized the role of the mentors, which should be moving away from their assessing roles to the adoption of more assisting, mediating roles. It was found that a supervisor should put more effort while visiting and guiding student teachers during their teaching practice. Instead of simply assessing student teachers with grades, they can also provide them with as much feedback as possible regarding strengths and weaknesses of their lessons. Another study investigating was carried out by Chien (2013) on a summer school programme for prospective English language teachers in the north-west United States. Three prospective teachers who have completed their elementary school teaching certificate were interviewed and observed. The main findings of her study revealed that the student teachers’ teaching style was limited. Additionally, there was insufficient collaboration between cooperating and prospective teachers. Similarly, Cahn (2014) studied five Vietnamese EFL student teachers’ experiences



during a six-week practicum period. The participants did not have any teaching experience before being admitted to the teacher training colleges or universities. Findings show that there was no deep learning that took place during the teaching practicum, and the student teachers were not provided with many opportunities for interactive learning. Cahn attributed that to the limited interaction between student teachers and their cooperating teachers. The relationship between the cooperating teachers and the student teachers was hierarchical rather than reciprocal which limited the student teachers' involvement in the ongoing process of constructing and reconstructing knowledge with cooperating teachers.

More importantly, teaching practice experience has a significant role to reform the student teachers' perceptions of their roles and responsibilities in their future careers (Harlin, Edwards & Briers, 2001). Therefore, understanding the student teachers' perceptions could be a stand to determine what really happened during training in order to plan for better professional training and teaching practice (Barnes & Lock, 2013).

Studies related to EFL/ESL student teachers' perceptions (Al Sohmani, 2012; Duong, 2014; Faez & Valeo, 2012) reported that the teaching practice experience was the most influential aspect of the training programmes. For instance, in their study of novice teachers' perceptions of preparedness and efficacy in the classroom, Faez and Valeo (2012) found that novice teachers valued the practicum because they drew from it to manage classrooms and plan appropriate lessons. They faced some teaching challenges in specific contexts which were attributed to their unpreparedness to use theoretical knowledge and adapt to these teaching contexts.

A similar study was conducted by Al Sohmani (2012) to investigate the perceptions of student teachers' teaching practice at schools after they had completed an EFL teaching programme at Ajman University of Science and Technology in the United Arab Emirates. The study found that most of the student teachers had positive perceptions towards teaching practice experience, school teachers, the academic supervisor, and the host school. However, some student teachers were very concerned about the duration of teaching practice at school. They were trained for one semester (16 weeks) and thought that the length of the teaching practice was not enough. They suggested more courses for teaching practice to allow them to gain practical experience and develop their teaching skills.

3. The Study Context

In Yemen, there are different structures of teacher education programmes before the Yemeni unification in 1990. Training institutions were provided for students who had completed their primary school to be trained for three years and become primary school teachers. However, after the Yemeni unification, the teacher preparation programmes for all education levels depend mainly on faculties of education (Obeidat, 2007). In faculties of education, the teacher education programmes focus on preparing students to be teachers of different subjects such as Arabic language, English language, Islamic education, Mathematics and Physics in schools. During the four years of preparation, students are provided with basic knowledge of teaching methods that they need



for their professional careers (Mahwari, 2015). Therefore, there were different departments that focused on preparing students to be competent in different fields.

The English Department at the Faculty of Education in Yemen offers a four-year programme that aims to prepare qualified English language teachers to teach at local primary and secondary schools. It receives a considerable number of students every year. Students are trained the basic language skills, and they also study a variety of subjects about English literature, linguistics, translation, and methodology. The graduates of this department who are awarded a Bachelor's Degree in education are expected to serve society mainly by becoming English teachers at primary and secondary schools. In addition, they would satisfy the need of the society for the English teachers and/or speakers (Faculty of Education Guide, 2012).

During their study at the faculty, students have to obtain 142 credit hours to graduate with a bachelor's degree in education, majoring in English Language Teaching for the local schools (grades 7-12). The Department is responsible for preparing the syllabi and plans for the English language teaching programme. The programme focuses on the subject matter of teaching English. It offers intensive courses on teaching methods, language skills, English literature, along with numerous courses in general knowledge and teaching practice. These courses are taught in four years (eight semesters), and the students have to pass all these courses. After completing the sixth semester, students join local public schools for practical teaching (Practicum) at the beginning of the seventh semester. At this current stage and onwards, they are referred to as "student teachers". Student teachers start teaching for one semester under the direct guidance of cooperating teachers. They practice teaching between 5 to 8 periods per week. During their teaching practice, they are also supervised by two university supervisors. Those supervisors are expected to minimally conduct two observations to observe, assist and assess each student teacher's teaching. Each lesson observation is usually followed by a short feedback session in which the supervisor provides the student teacher with some suggestions and comments on his/her teaching practice for improvement. These comments and suggestions are basically given on the lessons observed and the written lesson plans.

With reference to the context of the current study, there were a number of studies (Al-Jaro, Asmawi, & Hasim, 2017; Al-Jaro & Asmawi, 2018) that reported little pedagogical knowledge input which limits the student teachers' pedagogical practices during practicum. Further, to the best knowledge of the authors, no study has been conducted to investigate the student teachers' perceptions of their teaching practices. Therefore, this study would be an endeavour to fill the gap in a relatively limited searching setting. Additionally, it could provide the necessary information for the professional development of the EFL teaching practice in Yemen and suggest some insights for similar EFL/ESL teaching programmes.

4. The Aim and Questions of the Study



The purpose of this study is to explore the Yemeni EFL student teachers' perceptions of their teaching at schools during practicum. Understanding the student teachers' perceptions provide the necessary information for their professional development and continuous improvement of the EFL teacher education programmes in Yemen. In addition, it could provide insights into similar EFL teacher education programmes and suggest some practical and valuable recommendations for teacher educators, programme developers and policymakers. In order to achieve this purpose, the study seeks to answer the following questions:

1. What are the Yemeni EFL student teachers' perceptions of their teaching practice?
2. What are the Yemeni EFL student teachers' perceptions of supervision?
3. What are the Yemeni EFL student teachers' perceptions of the host schools?
4. How could the Yemeni EFL student teachers improve their teaching practice?

5. Methodology

5.1.1 Population and Sampling

The population of this study was fourth-year student teachers from the department of English, Faculty of Education at a public university in Yemen. They were 108 student teachers who had completed their practical teaching course at primary and secondary public schools. As the entire finite population was quite small, all student teachers were selected as the study participants on the basis of their availability (Creswell, 2005). There were 99 participants; 58 (58.6%) female students and 41 (41.4%) male students who had responded and returned the study questionnaire constituted the study sample.

5.2 Data Collection Instrument

Data of this study were collected using a questionnaire adopted from a previous study (Al Sohbani, 2012). The questionnaire's validity and reliability were checked and tested by its developer, Al Sohbani through using the expert validity and the internal consistency reliability estimate by using Cronbach's alpha, which yielded 0.88. It included two sections, A and B. Section A included 23 close-ended items that focused on the student teachers' perceptions of their teaching practice in general (6 items), supervision (12 items), and the host schools (5 items). The respondents were required to select the answer which best represented their views based on a five-point Likert scale: '1' strongly disagree (SD), '2' disagree (D), '3' undecided (UD), '4' agree (A), and '5' strongly agree (SA). In section B, there were three open-ended questions that elicited information on the positive and negative points of the teaching practice and the student teachers' suggestions for improvement. In addition, a pilot study was conducted prior to distributing the questionnaire to the study participants to examine the consistency of the questions and respondents' understanding level of the questionnaire. The Cronbach's alpha coefficient was also applied to assess the reliability of the data and measurement. It was 0.76 which was above 0.7 as the cut-off value (Hair, Bush, & Ortinau, 2003). Before adopting the questionnaire, a written permission was taken from the developer. It was then distributed in person to the study



participants with instructions to guide them. The participants were given 30 minutes which were enough to finish the questionnaire.

5.3 Data analysis

As the questionnaire comprised of two sections, the participants' responses to the first section (A) were statistically analyzed using descriptive statistics via SPSS software. The mean and standard deviation were computed for each statement. For the purpose of statistical analysis, each of the variables in the five-point Likert scale was coded as follows: SD '1', D '2', UD '3', A '4', and SA '5'. All the questionnaire items were positive attributions and graded as 1-2-3-4-5. Therefore, according to Birisci, Metin, and Karakas (2009) and Abedalaziz, Jamaluddin, and Leng (2013), the agreement ranges in the questionnaire were determined through the use of the formula $(n-1)/n$ where n is the number of ranges. The calculating of the interval width of the ranges between 1 through 5 was 0.8. Table 1 below shows the range of items in the questionnaire:

Table 1.
The Range of Statements

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1 - 1.80	1.81 - 2.60	2.61-3.40	3.41 - 4.20	4.21 - 5.00
Very low	Low	Medium	High	Very high

As shown in Table 1, the interval width of 1-1.80 indicated a very low level, the 1.81-2.60 interval indicated a low level, the 2.61-3.40 intended a medium level, the 3.41-4.20 indicated a high level, and the 4.21-5.00 indicated a very high level of agreement with the items in the questionnaire. Therefore, items that scored a mean of 3.41 and above were considered positive, while the items that scored 2.60 and below were considered negative.

On the other hand, the second section (B) of the instrument was analyzed qualitatively by reading the student teachers' written responses repeatedly and analyzing them to generate codes. Then similar codes were classified under one family or category. The result was three broad themes emerging from the analysis which represent the positive and negative points of the teaching practice and the student teachers' suggestions to improve their teaching practices.

6. Results and Discussion

6.1 EFL student teachers' perceptions of teaching practice

The analysis of the participants' responses to items 1, 2, 3, 4, 5, and 6 of the questionnaire revealed that they had positive perceptions of their teaching practice in general. This could be seen from the total mean score (3.5) of the first six items of the questionnaire. A close look at the analysis of each item in Table 2, showed that most of the participants strongly agree that teaching practice experience developed their teaching skills and classroom management (4.62). The mean score of item number 5 (3.95) showed that majority of the participants had



taught more than three periods per week. This could be interpreted that they valued the number of periods they taught every week. However, the mean score of item number 6 was relatively low (2.92), which indicates that the participants were not content with the length of the teaching practice. Further, items 2, 3, and 4 received medium level mean scores; 3.02, 3.33, 3.17 respectively which indicated that the participants were not quite satisfied with their teaching practice experience and the number of periods observed by their supervisors. They also had difficulties with transportation to move from the university to the host schools.

Table 2
Descriptive Statistics of Participants' Perceptions of Teaching practice

No	Item	Levels of agreement (%) (n=99)					Mean	S.D.
		DS	D	UD	A	SA		
1	The teaching practice experience developed my own teaching and classroom management.	0	2.0	0	32.3	65.7	4.62	.60
2	I was generally satisfied with the teaching practice experience.	14.1	27.3	10.1	39.4	9.1	3.02	1.27
3	It was very easy for me to move from university to school.	7.1	29.3	6.1	38.4	19.2	3.33	1.28
4	The number of periods observed by the supervisors was sufficient to evaluate my teaching.	18.2	22.2	6.1	31.3	22.2	3.17	1.46
5	I taught more than three periods a week.	11.1	11.1	4.0	19.2	54.5	3.95	1.43
6	The length of the teaching practice was adequate.	27.3	21.2	5.1	25.3	21.2	2.92	1.56
<i>Total</i>						3.5	1.27	

Findings of this category (i.e., the student teachers' perception of teaching practice in general) were consistent with those of Al Sohmani (2012); Faez and Valeo (2012), who contended that the student teachers highly emphasized the importance of the teaching practice experience to develop their teaching skills and classroom management. In addition, these result have also confirmed those findings of Al Sohmani (2012), who found that when the length of the teaching practice was short, the student teachers did not receive adequate practice. However, his study was conducted in a different context, and it is different in the



number of periods observed by supervisors which might limit the student teachers' opportunities to interact and receive feedback from their supervisors.

6.2 EFL student teachers' perceptions of supervision

Table 3 shows the mean scores of the participants' perceptions of supervision and the support they received during their teaching practice. Items 7-18 highlighted their perceptions of the cooperating teachers and university supervisors. Only item number 10 scored a high mean (4.23) and items numbers 8 and 13 scored low means (2.96 and 2.79 respectively). The other items 7, 9, 11, 12, 14, 15, 16, 17, and 18 scored medium to high means. The total mean was recorded at 3.58 which is relatively high, indicating that the participants have positive perceptions of their supervisors.

Table 3

Descriptive Statistics of Participants' Perceptions of Supervision

No	Item	Levels of agreement (%) (n=99)					Mean	S.D.
		DS	D	UD	A	SA		
7	The school teachers were very cooperative.	6.1	13.1	11.1	31.3	38.4	3.83	1.24
8	The school teachers provided frequent and valuable feedback regarding my teaching.	16.2	30.3	10.1	28.3	15.2	2.96	1.36
9	I observed experienced teachers at the school.	8.1	7.1	9.1	53.5	22.2	3.75	1.13
10	The school teachers were friendly.	1.0	5.1	9.1	39.4	45.5	4.23	.89
11	I benefited a lot from the school teachers.	5.1	18.2	15.2	49.5	12.1	3.45	1.08
12	My supervisor was helpful.	7.1	16.2	8.1	47.5	21.2	3.60	1.20
13	I got enough guidance from my supervisor before teaching each lesson.	29.3	18.2	10.1	29.3	13.1	2.79	1.47
14	The supervisor was objective and fair.	9.1	8.1	20.2	39.4	23.2	3.60	1.20



15	My supervisor provided direct and understandable feedback.	4.0	10.1	11.1	50.5	24.2	3.81	1.05
16	I had enough guidance from the supervisor before starting teaching at the school.	7.1	30.3	13.1	35.4	14.1	3.19	1.22
17	The supervisor was competent.	6.1	4.0	14.1	38.4	37.4	3.97	1.11
18	My supervisor allowed me to try new ideas in teaching.	5.1	12.1	11.1	44.4	27.3	3.77	1.13
<i>Total</i>						3.58	1.17	

A closer look at the results show that the student teachers acknowledged that the cooperating teachers and university supervisors were helpful, friendly, cooperative, and fair. However, they have negative perceptions of the kind of feedback and support provided by their cooperating teachers and the university supervisors. Most of the participants were dissatisfied with the cooperating teachers' feedback (2.97) and the guidance from the university supervisors (2.79).

These findings are in line with those of Cahn (2014) and Chien (2013), who found that no deep learning took place from the part of the student teachers because of their limited engagement of teaching style and lack of interaction with their cooperating teachers. In addition, these results implicitly support the argument of Kourieos (2012) that supervisors should increase the number of visits and put more emphasis on guiding student teachers during teaching practice. They should also provide them with much feedback instead of simply assessing them. Additionally, this part of the result contradicts with the findings of Al Sohmani (2012), who reported that the student teachers were satisfied and appreciated the overall supervisory support and the important values and knowledge conveyed by their experienced supervisors. That is quite different from the results of the present study, because of the lack of the student teachers' interaction with their supervisors, which is attributed to the latter's heavy workloads hours at their institutions.

6.3 EFL student teachers' perceptions of host schools

As displayed in Table 4, the total mean score of the last five items 19, 20, 21, 22, and 23 of the questionnaire which are concerned with the student teachers' perceptions of host school is quite high (3.68). This means that the participants have positive perceptions of the host schools and mostly agree with the statements.

Table 4
Descriptive Statistics of Participants' Perceptions of Host Schools



N	Item	Levels of agreement (%) (n=99)					Mean	S.D.
		DS	D	UD	A	SA		
19	The school cooperated well with the university.	13.1	21.2	17.2	29.3	19.2	3.20	1.33
20	The school environment was appropriate for the teaching practice.	17.2	20.2	9.1	31.3	22.2	3.21	1.44
21	The school gave me the textbooks needed (course books and workbooks) for my student teaching practice.	7.1	9.1	8.1	27.3	48.5	4.01	1.26
22	The school gave me the teacher's book needed for my student teaching practice.	9.1	14.1	2.0	30.3	44.4	3.87	1.36
23	During my student teaching practice experience, I felt that I was an accepted member of the school team.	5.1	6.1	5.1	38.4	45.5	4.13	1.09
<i>Total</i>							3.68	1.30

A deeper investigation into the descriptive analysis of the statement revealed that the participants show positive responses to statements 21, 22 and 23. They strongly agree with the teaching materials provided by the schools including the textbooks and the teacher's book. This is demonstrated in the mean scores of the items 21 and 22 as (4.01) and (3.87) respectively. In a similar vein, the participants revealed favourable perception towards the schools. They felt that they were accepted members of the school team. This was declared in their responses to item 23 which received a high mean score (4.13). These findings are fully aligned with those of Al Sohmani (2012), which revealed that the student teachers had positive perceptions towards the host school and were able to familiarize themselves and establish a rapport with the host school members. However, the participants showed a considerable negative perception towards the school cooperation with the university item number 19 and the appropriateness of the school environment item number 20. This was shown in the means scores of these items (3.20 and 3.21) which indicate that the school and university cooperation, as well as the school facilities, were not as expected by the student teachers. It has been argued that a closer relationship between teacher education programmes and host schools during practicum might help the student teachers in their transition to teaching practice at schools (Villers & Mackisack, 2011).

6.4 EFL student teachers' remarks and suggestions



Analysis of the participants' responses to Section B of the questionnaire (i.e., three open-ended questions) revealed their positive and negative remarks towards their teaching practice. In addition, it disclosed a list of the participants' suggestions to improve future teaching practice at host schools.

Concerning the participants' responses to the first open-ended question (what do you mostly like about teaching practice?), most of them reconfirmed their responses to Section A of the questionnaire by highlighting their positive perceptions of the teaching practice such as getting more experience from the practice, knowing more about the school environment, being a member of the school staff and feeling the responsibility of teaching.

Besides those, they mentioned other positive remarks for their teaching practice at host schools (Appendix A) which indicate their awareness of the significant roles of their experience. Some of these positive remarks include employing new methods of teaching, knowing new people and making good relationships, developing the spirit of cooperation with other teachers and students at schools, getting experience to deal with individual difference among students, experiencing new challenges, and being encouraged to find out information of the encountered ambiguous issues.

On the other hand, the participants showed their displeasure by listing some negative points (Appendix B) that they dislike about their teaching practice at schools. Some of these negative points include the large number of students in the class, lack of teaching materials and visual aids at schools, lack of supervisory support and a limited number of observation visits, the short duration of the practicum, weak level of students, the inappropriate school environment, and the lack of facilities.

Additionally, based on the participants' teaching experience, they offer some practical and noteworthy suggestions (Appendix C) that they believe, could improve future teaching practice in schools. For instance, they suggested extending the duration of practicum, establishing halls for teaching aids and English laboratories at schools, increasing the number of supervisory support, adding microteaching and simulated teaching courses, increasing the number of pedagogical knowledge related courses, and keeping a continuous contact between schools and the university.

7. Conclusion and Recommendations

The current study aims to explore EFL student teachers' perceptions of teaching practice at schools in Yemen. The findings reveal that the participants gave positive perceptions of their teaching practice, supervision, and host schools. Nevertheless, the findings disclose some negative perceptions of the participants especially on the kind of feedback and support provided by their cooperating teachers and the university supervisors, and the appropriateness of the school environment. Therefore, it is highly recommended that cooperating teachers and university supervisors should involve their supervisees in continuous discussion and provide them with feedback on their teaching practices.



More importantly, the student teachers have offered some significant suggestions based on their experience. Therefore, these suggestions should be taken into consideration by EFL teaching education programme administrators and Ministry of Education officers for further professional development of teaching practice in Yemen. These could contribute to plan and perform professional preparation and training of the EFL student teachers and improve their teaching competencies.

It should be noted here that the present study is limited to a specific context in Yemen. However, it might provide some insights, useful suggestions, and valuable information for educators, programme directors, and decision makers in the Yemeni contexts in general or perhaps in similar contexts of the Arab or Asian countries. For the purpose of comparing and contrasting the findings, it would be possible and valuable to conduct similar studies at other universities in Yemen and other EFL similar learning and teaching contexts, particularly neighbouring Arab countries. Future studies are recommended to investigate similar issues of EFL teacher education programmes at other universities in Yemen and similar educational contexts.

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Students' Perceptions toward Writing Class: Employing Writing Process Approach in Their English Essay Writing

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Abstract

The current study aimed to investigate students' perceptions toward employing writing process approach (WPA) in writing English essays. The samples of this study were 32 students majoring in English, selected by purposive sampling. They were assigned to write several types of essays in Essay Writing Course. The research instruments included questionnaire and semi-structured interview. The quantitative data from the questionnaire were analyzed for mean and interpreted using descriptive analysis. The qualitative data from the semi-structured interview were analyzed using content analysis. The results revealed that students perceived that employing WPA in their writing English essays was very effective. They strongly agree that utilizing WPA in Essays Writing classes help them in learning writing. When considering each domain, the results revealed that the most highly rated domain was instructors, followed by teaching and learning activities, and self-study, respectively. The least rated domain were materials for teaching. In conclusion, this study advised WPA use by instructors and students in EFL writing courses. It is important to remember that WBA has a very good recognition when implementing it in EFL writing classrooms.

Keywords: Perception, Writing Process Approach, Essay Writing

1. Introduction

Writing requires a complicated set of skills, including the ability to organize thoughts into words and paragraphs that readers will understand. The students gained the ability to communicate their views through written language in writing class. In this study, the emphasis of the EFL writing lesson was to help the students' English writing skills. The majority of students struggle to communicate their ideas in written English, in this case, a foreign language. The students' proficiency in EFL writing is influenced by a variety of issues, including their poor motivation, inability to translate words in context, lack of common vocabulary, and lack of approaches, strategies, and procedures that the teacher and students utilized.

Students' performance and ability are influenced by their attitude and motivation as well as the teachers' instructional methods. The achievement of the



students is improved by appropriate instructional teaching methods and students' learning strategies. According to the observation, most students are unable to compose essays because they are only concerned with the final output. The students never employ any essay writing techniques or procedures. They simply expressed what was on their minds in textual form. Before writing an essay, the students failed to choose a topic, create an outline, rewrite their work, and edit and proofread it before publishing it. When writing essays, the students only paid attention to the final product and never considered the writing process.

The writing process approach may help students write more effectively (Asriati & Maharida, 2013). The process method is one strategy that has had a considerable impact on second language writing (Zen, 2005). In other studies, the impact of the process writing technique on students' writing skills was examined and quantified (Imelda, Cahyono, & Astuti, 2019). The study found that the students' writing skills were significantly impacted by WPA.

Individuals' views eventually have an impact on their attitudes. Perception is typically defined as a bodily experience that shows a person's capacity for understanding the world through conscious features (Rofiqoh & Chakim, 2020). Students' perceptions of writing instruction strategies—which can be either negative, favorable, or extremely positive—influence the methods they choose to utilize to develop their writing skills.

The writing process approach (WPA) must be evaluated from the perspective of the students in this study since perception is a crucial element in helping students become better writers. The current study, which included quantitative and qualitative methods, explored how the writing process approach was perceived by the students in an EFL writing course.

2. Research Objectives

To investigate students' perceptions toward employing writing process approach in writing English works.

3. Research Question

What are students' perceptions toward employing writing process approach in writing English works?

4. Literature Review

Writing Process

Writing Process Approach (PWA) is a reflection of the notion that writing is a thinking process in which a writer undergoes the thinking process before he or she produces a final piece of writing based on their thought (Brown, 2001). Process writing approach—PWA—is a method of writing teaching that emphasizes the process rather than the products. With the writing process, learners become more cognizant of themselves, and discover how to generate the writing. Basically, the four basic writing stages are incorporated in Process Writing; these are planning, drafting (writing), revising (redrafting), and editing (Diliduzgun, 2013).

According to Holmes (2004) in Elshirbini, et al. (2013), using a process-oriented approach can help adult students of English as a Foreign or Second Language with the planning and production stages of writing. The authors identify



some characteristics of this approach and offer some suggestions for developing activities to humanize and improve the experience of writing. According to Tompkins (1990), the process of writing rather than the final product is the present focus of writing training.

The stages of the writing process are pre-writing, drafting, writing, sharing and responding, revising and editing, and publishing, according to Graves et al. (2007) in Wati (2013: 19). Pre-writing, Prewriting techniques like brainstorming and freewriting, which are described here, can aid authors in generating ideas, gathering data, utilizing tacit knowledge, and organizing their thoughts. Drafting, the students are encouraged at this point to develop their thoughts into rough drafts without first checking for grammatical accuracy. The process-based writing has already been described. At the revising stage, the importance of grammar precision will be highlighted (Widodo, 2008).

Sharing and responding, sharing involves distributing your work to others and receiving comments on how you are doing (Peha, 2002: 10). The primary goal of commenting or providing feedback is to view students' initial or revised papers (Widodo, 2008).

Editing and revising, according to Widodo (2008), revising involves not just examining grammatical problems but also addressing the overall substance and structuring of thoughts in order to make the writer's intention more evident. Publishing, A piece of writing must be ready for publication in order for the public to read, comprehend, and appreciate it (Peha, 2002: 19). As a result of having to go through a longer learning process, students are now required to publish their writing throughout this stage.

According to Brown (2001) in Onozawa (2010, p. 157), the process approach is beneficial to students in language learning since they are the ones who create the language, they must concentrate on the message and the content, and their own intrinsic motivations are appreciated.

Perceptions

Students' perception had an impact on their behavior, drive, and attitude during the learning process. There was a student writing product as a result of the WPA's deployment. The description of how the students' impression of the writing process in an EFL writing class and which stage helps the students' writing product improve was very intriguing. Analyzing the students' perceptions is one way to assess how well a method, technique, or strategy is being used in the teaching and learning process because the perception indicates how the students have used the method, technique, or strategy.

According to Rofiqoh & Chakim (2020), perception is the process through which individuals choose, arrange, and interpret sensory stimuli to produce meaningful information about their working environment. Positive student perception indicates that the strategy is accepted and is useful. On the other side, the acceptance strategy is limited if the students' perception is unfavorable. It implies that the success of a method used by teachers or students depends on how the students perceive it.

5. Research Methodology



5.1 Population and Samples

5.1.1 The population of this study was 32 English major students who enrolled in the Essay Writing course in the first semester of the academic year 2022 at the Faculty of Humanities and Social Sciences at BRU.

5.1.2 The samples of this study were 32 English major students who enroll in the Essay Writing course in the first semester of the academic year 2022 at the Faculty of Humanities and Social Sciences, BRU, selected by purposive sampling. The samples were assigned to write several types of essays including narrative, descriptive, comparison and contrast, cause and effect, and persuasive essays. The samples were required to write their works through the writing process, namely, they have to follow each step: choosing a topic, brainstorming ideas, outlining, drafting, revising, editing, and presentation respectively.

5.2 Research Instruments

The instruments employed in this study were questionnaire and the interview.

5.2.1 Questionnaire

The questionnaire was employed as the research instrument in this study. It consists of 4 parts as follows: The first part is the general information data including gender, age, GPA of the respondents. Second part consists of the questions regarding students' perceptions toward employing writing process approach in writing English works. The researchers drafted the questionnaire using the rating scale from Likert's five levels: 5 means Strongly Agree, 4 means Agree, 3 means Neutral, 2 means Disagree, 1 means Strongly Disagree. The third part provides for students to give suggestions and opinions. The respondents can write the suggestions about students' perceptions toward employing writing process approach in writing English works.

5.2.2 Semi-structure Interview

Another research instrument of this study was a semi structure interview. It consists of the questions which aimed to discover the students' perceptions toward employing writing process approach in writing English works.

5.3 Data Collection

The data were collected by administering the questionnaire. The students were asked to fill out the questionnaire relating to their perceptions toward employing writing process approach in writing English works. After that, the researcher interviewed them about their students' perceptions toward employing writing process approach in writing classes. The duration of this study was during 1-30 September 2022.

5.4 Data Analyses

The data obtained were analyzed by using the data analysis methods as follows.

After checking the completion of each questionnaire, the researchers analyzed the data collected from questionnaires by using statistical package. Three statistical devices were employed in this study as follows:

5.4.1 The general information of the samples was calculated by frequency and percentage



5.4.2 The data about the students' perceptions toward employing writing process approach in writing English works obtained from the questionnaire were calculated by mean (\bar{x}) and standard deviation (S.D.). The following criteria were employed for interpretation (Criteria Likert's Scale) as follows:

1.00 – 1.80	means	Strongly disagree
1.81 – 2.60	means	Disagree
2.61 – 3.40	means	Neutral
3.41 – 4.20	means	Agree
4.21 - 5.00	means	Strongly agree

After that, the results of the interpretation were calculated to find the perceptions using the following criteria (Criteria Likert's Scale):

1.00 – 1.80	means	Not very effective,
1.81 – 2.60	means	Not effective,
2.61 – 3.40	means	Neutral,
3.41 – 4.20	means	Effective,
4.21 - 5.00	means	Very effective.

5.5 Statistics Used in Data Analyses

Statistics used in this study were mean, percentage and standard deviation.

6. Research Results

6.1 The Students' Overall Perceptions on Employing Writing Process Approach in Writing English Essays from Questionnaires

Table 6.1

Students' Overall Perceptions on Employing Writing Process Approach in Essay Writing English

Statement	X	S.D.	Interpretation
1. Materials	4.20	0.673	Effective
2. Self-study	4.21	0.766	Very effective
3. Instructor	4.34	0.771	Very Effective
4. Teaching and Learning Activities	4.26	0.67	Very Effective
Average	4.24	0.726	Very Effective

The results in Table 6.1 reveal that overall the participants well perceived that employing writing process approach in writing English essay was very effective (4.24). When considering each domain, the results reveal that the most highly rated domain was lecturers (4.34), followed by teaching and learning activities (4.26), Self-study (4.21), and materials (4.20), respectively. Considering



the attributes of each individual domain, the data obtained from the questionnaire revealed the students' perceptions in Tables 6.2-6.5.

6.1.1 Students' Perceptions toward the Instructor on Employing Writing Process Approach in English Essay Writing

Table 6.2
Students' Perceptions toward the Instructor on Employing Writing Process Approach in English Essay Writing

Statement	X	S.D.	Perception	Interpretation
Instructor				
1. Teaching and learning using the writing process, teachers lecture to students to have an understanding of the process of essay writing that is correct and clear.	4.20	0.775	Strongly Agree	Very Effective
2. Students learn language patterns and grammar from feedback from teachers.	4.44	0.512	Strongly Agree	Very Effective
3. Teaching by using the writing process teachers help students to have more confidence in writing English.	4.38	1.025	Strongly Agree	Very Effective
Average	4.34	0.771	Strongly Agree	Very Effective

When considering the students' perceptions toward the instructor for teaching on employing writing process approach in English essay writing, the results reveal that overall the participants well perceived that instructor was very effective (4.34). In this domain, the students perceived they learn language patterns and grammar from feedback from teachers as the highest rank (4.44), followed by teaching by using the writing process, teachers help students to have more confidence in writing English (4.38), and teaching and learning using the writing process, teachers lecture to students to have an understanding of the process of essay writing that is correct and clear (4.20), respectively.

6.1.2 Students' Perceptions toward Teaching and Learning Activities on Employing Writing Process Approach in English Essay Writing

Table 6.3
Students' Perceptions toward Teaching and Learning Activities on Employing Writing Process Approach in English Essay Writing



Statement	x	S.D.	Perception	Interpretation
Teaching and Learning Activities				
1. Teaching and learning using the writing process helps students have the ability to write according to the steps that have been set: brainstorming ideas, outlining, drafting, revising, and editing.	4.20	0.775	Strongly Agree	Very Effective
2. Teaching by using the writing process is an interesting teaching method, and it is easy to understand.	4.07	0.704	Agree	Effective
3. Overall, the students were satisfied with the process-oriented writing teaching process.	4.50	0.516	Strongly Agree	Very effective
Average	4.26	0.67	Strongly Agree	Very Effective

When considering the students' perceptions toward the teaching and learning activities for teaching on employing writing process approach in English essay writing, the results reveal that overall the participants well perceived that teaching and learning activities was very effective (4.26). In this domain, the students perceived they were satisfied with the process-oriented writing teaching process as the highest rank (4.50), followed by teaching and learning using the writing process helps students have the ability to write according to the steps that have been set: brainstorming ideas, outlining, drafting, revising, and editing (4.20), and Teaching by using the writing process is an interesting teaching method, and it is easy to understand (4.07), respectively.

6.1.3 Students' Perceptions toward Self-study on Employing Writing Process Approach in English Essay Writing

Table 6.4

Students' Perceptions toward Self-study on Employing Writing Process Approach in English Essay Writing

Statement	x	S.D.	Perception	Interpretation
Self-study				
1. Teaching based on writing process is helpful for students to learn, sort, organize, and communicate systematically.	4.14	0.864	Agree	Effective



Statement	x	S.D.	Perception	Interpretation
2. Teaching by using the writing process gives students the opportunity to evaluate their own work and that of their peers.	4.13	0.743	Agree	Effective
3. Teaching by using the writing process allows students to carefully check grammar and punctuation and the use of connecting words in writing more	4.20	0.676	Agree	Effective
4. Teaching based on writing process provides students with greater courage to write independently in English.	4.07	1.033	Agree	Effective
5. Teaching and learning using the writing process helps students see the benefits of process-oriented writing and will use it in writing later.	4.50	0.516	Strongly Agree	Very effective
Average	4.21	0.766	Strongly Agree	Very Effective

When considering the students' perceptions toward self-study for teaching on employing writing process approach in English essay writing, the results reveal that overall the participants well perceived that self-study was very effective (4.21). In this domain, the students perceived teaching and learning using the writing process helps students see the benefits of process-oriented writing and will use it in writing later as the highest rank (4.50), followed by teaching by using the writing process allows students to carefully check grammar and punctuation and the use of connecting words in writing more (4.20), and teaching based on writing process is helpful for students to learn, sort, organize, and communicate systematically (4.14), respectively.

6.1.4 Students' Perceptions toward Materials for Teaching on Employing Writing Process Approach in English Essay Writing

Table 6.2
Students' Perceptions toward Materials for Teaching on Employing Writing Process Approach in English Essay Writing

Statement	x	S.D.	Perception	Interpretation
Materials				
1. Teaching based on writing process is a lesson for learners to learn writing principles from exercises in textbooks.	4.27	0.704	Strongly Agree	Very Effective



Statement	x	S.D.	Perception	Interpretation
2. Teaching and learning by using the writing process, there are interesting and sufficient learning materials for use in teaching and learning.	4.13	0.640	Agree	Effective
3. Teaching based on writing process provides teaching materials related to the content, which help better understanding and learning.	4.20	0.676	Agree	Effective
Average	4.20	0.673	Agree	Effective

When considering the students' perceptions toward materials for teaching on employing writing process approach in English essay writing, the results reveal that overall the participants well perceived that materials was effective (4.20). In this domain, the students perceived teaching based on writing process is a lesson for learners to learn writing principles from exercises in textbooks as the highest rank (4.27), followed by teaching based on writing process provides teaching materials related to the content, which help better understanding and learning (4.20) and teaching and learning by using the writing process, there are interesting and sufficient learning materials for use in teaching and learning (4.13), respectively.

6.2 The Qualitative Data of Students' Perceptions on Employing Writing Process Approach in English Essay Writing from the Interview

After getting the questionnaires' findings, the interview was used to find out the following information about students' perception of WPA in EFL class. The researcher interviewed ten students to probe their perception in depth. The interviews were semi-structured. The questions of interviews were:

Q1. What are the benefits and advantages of writing using the writing process?

The students agreed that the writing process approach can help them in writing as the response to the interview: *It helps to distinguish the order of the writing process / it makes the writing more complete and gradual, and make it easier for readers to understand/ it helps to better sort the story/ it helps to divide the steps so that we can more easily split the data and write it to.*

Q2. What do students want to add to the teaching of writing using the writing process?

The students want to add to the teaching of writing using the writing process as their response to the interview: *I would like this course to add some additional techniques and methods that can help people with less language background get inspiration or skills in good writing. / I would like the professor to have a book in Thai language as well. / I would like to add more content, deeper and teach more formal and academic sentences./ Activities during the study period, such as content-related games, which can help students familiar with English during the study period. / I prefer some tutorial clips and examples.*



Q3. What are the difficulties in the teaching of writing using the writing process?

Most students perceived they have difficulties in editing step as their response to the interview: *I have problems in editing grammar in writing because editing requires correct grammar rules and I am not good at grammar such as tense, punctuation. I have problem in writing essay and I think editing is the hardest. Editing is the hardest because the knowledge of grammar is not very good.*

6. Discussion

The results from this study reveal that overall the students perceived that employing writing process approach in writing English essays was very effective. Also they have a positive perception in all four aspects, namely, instructors, teaching and learning activities, self-study, and materials. These favorable perceptions could be the outcome of important factors. The methodical writing approach aids in improving their writing skills. EFL writers benefit from the writing process method, which includes pre-writing, drafting, revising, editing and proofreading, and publication. The writing process is thus a precise, organized technique to assist the students in improving their writing. The process-based approach helps students develop their ideas and organize them in a logical way, which improves their ability to write fluently (Agustiana, 2016). By utilizing the WPA, the students became more conscious of the necessity to plan ahead of time and edit the first draft in order to improve their writing. FA claimed that because it requires numerous steps to complete a piece of writing, the writing process aids in my writing improvement. By using WPA in EFL writing classes, the students' statements demonstrated an improvement in their writing skills. The other study made use of classroom action research and found that teaching students the writing process approach enhanced their writing skills (Asriati & Maharida, 2013; Miftah, 2015; Gafur, 2020; Syarofi, Kuswahono, & Rizky, 2018).

7. Conclusion

According to the questionnaire results, these students had a very favorable opinion of their writing class's writing instruction. In contrast, none of the students think otherwise. The WPA was viewed as useful and beneficial by the students for improving their writing, particularly the pre-writing and rewriting steps. In summary, this study recommended that teachers and students in EFL writing classes employ the WPA technique. The writing process approach has a very positive reputation, which should be taken into account when using it in EFL writing classes. However, more extensive research is required to learn more about how students perceive the WPA in EFL writing classes and to determine its benefits and drawbacks.

8. Recommendations

More extensive research is required to learn more about how students perceive the WPA in EFL writing classes and to determine its benefits and drawbacks.

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Using Communicative Language Teaching and Semantic Mapping to Improve English Vocabulary Learning Ability of Prathomsuksa 6 Students

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Abstract

This research's purposes were to compare the English vocabulary learning ability of Prathomsuksa 6 students before and after learning using communicative language teaching and semantic mapping, to study the English vocabulary retention after learning using communicative language teaching and semantic mapping, and to investigate the students' attitude towards teaching English vocabulary using communicative language teaching and semantic mapping. The sample of the study consisted of 16 Prathomsuksa 6 students in the first semester of the academic year 2022 at Bannongwanongpai School, Mueang, Udon Thani, under Udon Thani Primary Educational Service Area Office 1. The research instruments included 12 lesson plans, an English vocabulary learning ability test, and an attitude questionnaire towards teaching English vocabulary using communicative language teaching and semantic mapping. The duration of the study was 12 weeks, 2 hours a week, or 24 hours in total. Statistics used for data analysis were percentage, mean, standard deviation, one sample t-test, and t-test for dependent samples. The students' posttest score was 32.38 or 80.94 that was higher than the students' pretest score that was 17.63 or 44.06 and higher than the set criterion 70 percent. The students had retention of English vocabulary learning. Finally, the students' attitude was at a good level.

Keywords: Teaching English Vocabulary Using Communicative Language Teaching and Semantic Mapping, English Vocabulary Learning Ability, English Vocabulary Retention

1. Introduction

English unquestionably serves an increasingly important role. There are around 1.35 billion people worldwide who speak English either natively or as a second language in 2021 (Szmigiera, 2021). Learning English becomes more necessary and important to daily life, as foreign languages serve as an important tool for communication, education, seeking knowledge, livelihood and creating understanding of cultures and visions of the world community (The Ministry of Education, 2008). The English language plays a very important role for the people whose native language is not English because it opens a lot of opportunities for them (Adil, 2022). In the Association of Southeast Asian Nations (ASEAN), English communication context is considered as intercultural communication and is of



great importance to all involved (Varner & Beamer, 2010). Labor and business can move freely across the regional borders under ASEAN agreements (Yamazaki & Kayes, 2004), and a key to achievement is English as the ASEAN Charter states that the formal medium language for all communications in ASEAN is English.

English has been taught as a foreign language to all levels of education in Thailand. English is practically studied earlier from Prathomsuksa 1 to university (Rohmatillah, 2014). However, in many schools there are still several problems involving the teaching and learning of English. Furthermore, students always are faced with writing and spelling a word incorrectly and also students found difficulties in choosing the appropriate meaning of the words. Vocabulary is a general need to draw a clear distinction between comprehension and production (Nattinger, 1988). People use the knowledge of vocabulary to express ideas, to construct sentences, to understand what you read, write, and what you want to speak and listen (Chiang, 2009). From the Ordinary National Educational Test (O-NET) in the past few years showed that Thai students have the lowest mean score in English, and the researcher's observation in the classroom supported that there are many factors affecting students' learning comprehension, one of the most important factors is vocabulary. Students faced difficulties in learning vocabulary such as pronouncing the words, writing and spelling, grammatical form, choosing the appropriate meaning, unable to use the appropriate word based on the context, and confusing when they found words (Rohmatillah, 2014). Another problem people face in learning English vocabulary is that they learn new words, but they tend to forget what they have learned quite soon after they just learned them (Manganello, 2019).

There are several interesting activities that English teacher usually use for teaching vocabulary such as semantic mapping which is a good technique for teaching and word pattern or organization (Zaid, 1995). Semantic mapping is a strategy that can help the learner to store words better (Morin & Goebel, 2001). Although many studies have explored especially middle schools, high schools and colleges from abroad, there has not been much Thai research conduct on semantic mapping to improve vocabulary learning and retention at primary schools. Moreover, teaching English in the classroom, students need more than lecturing and listening to the teacher. With the aim of developing effective ways to promote the language learners' competency, Communicative Language Teaching (CLT) seems to be one of the most popular methods in the revolution of language teaching (Das, 1985), and CLT has been at the forefront of foreign language pedagogy for the past two decades (Long, 1996). Therefore, the researcher wants to conduct this research about vocabulary learning and retention of the students toward the communicative language teaching and semantic mapping treatment because there are many problems students' memory, they cannot memorize for a long term and have no motivation to learn vocabulary. The researcher designs to study the use of communicative language teaching and semantic mapping to improve English vocabulary learning ability to help students who face with the vocabulary learning problems such as spelling, pronunciation, meaning, and use. Hence, the researcher would like to apply communicative language teaching and semantic mapping to Prathomsuksa 6 students in Bannongwanongpai School to see whether this method was effective for English class and investigate the



students' attitude towards teaching English vocabulary through communicative language teaching and semantic mapping. The finding of this study might take an important role in teaching English vocabulary of Thailand in the future.

2. Research Questions

In this study the research questions were:

2.1 Could the communicative language teaching and semantic mapping enhance students' English vocabulary learning ability?

2.2 Did the communicative language teaching and semantic mapping affect English vocabulary retention?

2.3 What was the students' attitude towards teaching English vocabulary through communicative language teaching and semantic mapping?

3. Research Objectives

In this study the objectives were:

3.1 To compare the English vocabulary learning ability of Prathomsuksa 6 students before and after learning using communicative language teaching and semantic mapping.

3.2 To study the English vocabulary retention of Prathomsuksa 6 students learning using communicative language teaching and semantic mapping.

3.3 To investigate the students' attitude towards teaching English vocabulary through communicative language teaching and semantic mapping.

4. Literature Review

4.1 Communicative Language Teaching (CLT)

4.1.1 Definition of Communicative Language Teaching

CLT is a combination of systemic and functional aspects of language, and the emphasis is on language use rather than the structure of language itself (Littlewood, 2002). CLT is an approach to language teaching that emphasizes authenticity, interaction, student-centered learning, task-based activities, and communication for the real world and meaningful purposes (Brown, 2007). Furthermore, Communicative language teaching (CLT) is an approach to language teaching that emphasizes learning a language first and foremost for the purpose of communicating with others (Duff, 2014). In summary, CLT is an approach of the combination of systemic and functional aspects of language teaching that emphasizes authenticity, interaction, student-centered learning, task-based activities, and communication for the real world and meaningful purposes.

4.1.2 PPP Method

PPP is a three-part teaching paradigm: Presentation, Practice and Production; based on behaviorist theory which states that learning a language is just like learning any other skill (Ur, 1996). In addition, a teaching method based on PPP should have three phases as follows: 1) Presentation stage, 2) Practice stage and 3) Production stage (Willis & Willis, 1996). Moreover, teaching English procedure by using PPP (presentation, practice, production) has close ties to audiolingual methodology and the oral-situation approach, and which is still, whatever method a teacher follows, widely used for teaching certain kinds of



language at lower levels (Harmer, 2015). In summary, in this research, the researcher applied teaching English procedure by using PPP (Presentation, Practice, and Production) of Harmer to create English vocabulary teaching steps.

4.2 Semantic mapping

4.2.1 Definition of Semantic Mapping

Semantic mapping is a graphic arrangement showing the major ideas and relationships in text or among word meanings (Sinatra, Gemakel & Berg, 1984). It also helps students see how words are related to one another (Heimlich & Pittelman, 1986). In addition, semantic mapping led to better vocabulary retention because new lexical items are introduced in semantic networks (Stoller & Grabe, 1993). Moreover, semantic mapping is an effective technique for teaching vocabulary and textual patterns of organization, and it is also effective for improving note-taking and creative thinking skills (Zaid, 1995). In summary, semantic mapping assists the learner to learn unknown words through known words in a semantically related network.

4.2.2 The Procedures of Semantic Mapping Strategy

There are 5 steps of semantic mapping strategy as follows: 1) introducing the topic, 2) brainstorming, 3) categorization, 4) personalizing the map, and 5) post-assessment synthesis (Zaid, 1995). In addition, in the semantic mapping classes, vocabulary instruction is carried out during a part of each class period for an entire semester as follows: 1) Phase 1: the teacher describes and presents explicitly the semantic mapping strategy to the learners, 2) Phase 2: the teacher writes the central theme of the text on the board., 3) Phase 3: the class is divided into small groups, and they are encouraged to look up the words they do not know and suggest words other while the teacher is moving around the class to provide help, 4) Phase 4: the teacher writes the suggested words and connects them with lines and arrows to the main word, 5) Phase 5: students in each group have to elaborate on the words they suggested, explaining to the other groups why they include them in their semantic maps and how they are related to the central word, and 6) Phase 6: students are asked to copy the maps in their notebooks and use new vocabulary items in new contexts (Morin & Goebel, 2001). In this research, the researcher applied the semantic mapping procedures of Morin & Goebel to create English vocabulary teaching steps.

5. Research Methodology

5.1 Samples

The sample in this study was 16 Prathomsuksa 6 students studying English in the first semester of the academic year 2022 at Bannongwanongpai School, Mueang, Udon Thani, under Udon Thani Primary Educational Service Area Office 1. These students were selected by stratified random sampling.

5.2 Research Instruments

The research instruments included the 12 lesson plans, the pretest and posttest, and the questionnaire. Statistics used for data analysis were percentage, mean, standard deviation, one sample t-test, and t-test for dependent samples.



5.3 Data Collection

Data collection processes in this study were as follows:

5.3.1 The Prathomsuksa 6 students were asked to take the pretest to see vocabulary background knowledge.

5.3.2 The students were taught by the researcher for 24 hours based on 12 lesson plans.

5.3.3 After finishing teaching and learning, the students were required to do the posttest.

5.3.4 The questionnaire was provided to students required to rate the score for each item to investigate their attitude towards teaching English vocabulary through communicative language teaching and semantic mapping.

5.3.5 The students were asked to do the posttest again after 2 weeks to see the vocabulary retention.

5.3.6 The data were analyzed to test the hypothesis.

5.4 Data Analysis

For analyzing the effectiveness of the English vocabulary learning ability test, Percentage was used. The Mean (\bar{x}) and Standard Deviation (S.D.) were used for analyzing the pretest and the posttest scores and the sample's attitude. The validity (IOC) was examined by three experts and had the IOC of 0.67-1.00. The reliability of three raters based on Scott was used to calculate English vocabulary ability test part 1, which the value was 0.97 whereas the reliability (KR - 20) based on Kuder - Richardson was used for examining the English vocabulary test part 2, which the value was 0.76. The index of difficulty was analyzed and was between 0.20-0.80. The test discrimination was between 0.25 - 1.00. In addition, one sample t-test was used or analyzing the students' posttest scores with the criterion 70%, and t-test for dependent samples was used for comparing between students' pretest and posttest scores.

6. Research Results

The results were presented according to the research objectives as follows:

6.1 The results of the study of English vocabulary leaning ability of Prathomsuksa 6 students before and after using communicative language teaching and semantic mapping

The overall result of the study of English vocabulary leaning ability of Prathomsuksa students before and after using communicative language teaching and semantic mapping was presented in Table 1 below:

Table 1

The overall result before and after using communicative language teaching and semantic mapping



No.	Pretest (40 scores)		Posttest (40 scores)	
	Scores	Percent	Scores	Percent
1	18.00	45.00	34.00	85.00
2	15.00	37.50	31.00	77.50
3	13.00	32.50	29.00	72.50
4	17.00	42.50	34.00	85.00
5	20.00	50.00	35.00	87.50
6	19.00	47.50	34.00	85.00
7	20.00	50.00	31.00	77.50
8	16.00	40.00	29.00	72.50
9	20.00	50.00	34.00	85.00
10	24.00	60.00	37.00	92.50
11	18.00	45.00	31.00	77.50
12	23.00	57.50	33.00	82.50
13	12.00	30.00	28.00	70.00
14	18.00	45.00	35.00	87.50
15	15.00	37.50	29.00	72.50
16	14.00	35.00	34.00	85.00
(\bar{X})	17.63	44.06	32.38	80.94
S.D.	3.38		2.68	

According to the information presented in Table 3, the students' pretest mean score of English vocabulary leaning ability prior to using communicative language teaching and semantic mapping was 17.63 out of 40, accounting for 44.06%. After the instruction of English vocabulary using communicative language teaching and semantic mapping, the posttest mean score was 32.38 out of 40, accounting for 80.94%.

After experimentation of the teaching procedures to Prathomsuksa 6 students, the researcher compared the students' scores to the set of criterion 70 percent. Data were analyzed by using one sample t-test. The findings of data analysis are shown in Table 2 below:

*Table 2
A comparison the students' scores to the set of criterion 70 percent*

Test	N	\bar{X}	S.D.	70 %	t
Posttest	16	32.38	2.68	28	48.32*

*p < .05

Table 2 shows the students' posttest mean score on English vocabulary learning ability was 32.38, which was significantly different at the 0.05 level.

The posttest score of 80.94 % was significantly higher than a set of criterion 70 percent, supporting the first hypothesis that the students' English vocabulary learning ability after studying English vocabulary using communicative language teaching and semantic mapping is not less than the set of criterion 70 percent.



Before the instruction, the students had been given the pretest with 40 items and 40 scores. Then after the instruction finished the students were assigned to do the posttest which was the same previous test in order to compare the English vocabulary learning ability of the students. The result is given in Table 3 below:

Table 3
A comparison of English vocabulary learning ability between pretest and posttest

Test	N	\bar{X}	S.D.	t
Pretest	16	17.63	3.38	23.95*
Posttest	16	32.38	2.68	

*p < .05

According to data in Table 3, the statistics analysis results of the comparison between pretest score and posttest score revealed that the pretest's mean and standard deviation were 17.63 and 3.38 respectively. While the posttest's mean and standard deviation were 32.38 and 2.68 respectively. The results showed significant differences between the pretest and the posttest. It indicated that the English vocabulary learning ability of the Prathomsuksa 6 students differs significantly at the .05 level based on their performance in the posttest. It revealed that the English vocabulary learning ability of the Prathomsuksa 6 students posttest score was higher than the pretest score.

6.2 Results of the study of the English vocabulary retention of Prathomsuksa 6 students learning using communicative language teaching and semantic mapping

In order to see the English vocabulary retention of Prathomsuksa 6 students, the researcher administered the same posttest again after two weeks, and then data were statistically analyzed by using t-test for Dependent samples. The results were presented in Table 4 below:

Table 4
A comparison of the English vocabulary retention of Prathomsuksa 6 students

Test	N	\bar{X}	S.D.	t
1 st posttest	16	32.38	2.68	2.08
2 nd posttest	16	33.00	2.61	

According to data in Table 4, the statistical analysis revealed that the mean and standard deviation on the 1st and the 2nd posttest were 32.38, 2.68 and 33.00 and 2.61 respectively. The results showed no significant differences between mean scores for the 1st and the 2nd. This indicated that there was English vocabulary retention after two weeks.



6.3 Results of the investigation on attitudes of Prathomsuksa 6 students towards teaching English vocabulary using communicative language teaching and semantic mapping

The students' attitudes towards communicative language teaching and semantic mapping to teaching English vocabulary results based on the attitude questionnaire consisting of 20 items using a five-point Likert's rating scales were shown in Table 5.

Table 5
The results of the investigation of attitudes of Prathomsuksa 6 students towards teaching English vocabulary using communicative language teaching and semantic mapping

Questionnaire	N	\bar{X}	S.D.	Interpretation
Students' attitudes towards teaching English vocabulary using communicative language teaching and semantic mapping	16	4.47	0.16	good

Table 5 showed a good level of students' attitudes towards teaching English vocabulary using semantic mapping with the mean score of 4.47 and the standard deviation of 0.16. The results presented above indicated students' positive attitudes towards communicative language teaching and semantic mapping.

7. Discussion

The research findings can be discussed in the following aspects:

7.1 According to study and compare the English vocabulary learning ability of Prathomsuksa 6 students before and after learning using communicative language teaching and semantic mapping, the pretest mean score was 17.63 or 44.06 % , and the posttest mean score was 32.38 or 80.94 % . It revealed that the posttest mean score in the posttest was higher than 70 percent which was in accordance with the first hypothesis. Moreover, the mean score in the posttest was higher than that in the pretest which was in line with the second hypothesis due to the following reasons: Firstly, Teaching English vocabulary could help students to learn English vocabulary better. The students had motivation to draw the background of the knowledge, engaged to brainstorm in groups, and actively participated in the classroom. Secondly, through semantic mapping integrated with the three steps of teaching vocabulary learning ability. The students achieved higher scores in the posttest than those in the pretest. Thirdly, in semantic mapping used for teaching students' English vocabulary use, students learned to create visual representations of models, idea, and the relationships between concepts and to draw containing concept and lines, with connecting phases on the lines, between the concepts, for example, helping students achieve higher scores in the English vocabulary use section. This result was consistent with the study of Katchamat (2018), Thaledon (2018), and Mohammed (2020).



7.2 After 2 weeks (14 days) of taking the posttest, the students who learned English vocabulary through communicative language teaching and semantic mapping still had retention of English vocabulary knowledge, supporting the third hypothesis. Teaching English using communicative language teaching and semantic mapping which consisted of the three steps of teaching: presentation, practice, and production caused retention of English vocabulary learning that focuses on the communication and use of the language based on student-centered learning Brown (2007). This result was consistent with the study of Suksamarn (2021).

7.3 The results of the investigation the students' attitude towards teaching English vocabulary through communicative language teaching and semantic mapping pinpointed students' attitude was at a good level. From the result, teaching English vocabulary using communicative language teaching and semantic mapping not only beneficial for vocabulary knowledge but also make them enjoy learning vocabulary. Students interacted in the classroom and cooperated working with their friends. In addition, they also interacted with the teacher to get assistance for learning. These built students' positive attitude. This result was consistent with the study of Hamdan and Alharbi (2017) and Thaledon (2018).

8. Conclusion

The students' pretest mean score on English vocabulary learning ability was 17.63 or 44.06%, whereas the students' posttest mean score was 32.38 or 80.94%, showing a statistically significant increase in students' English vocabulary leaning ability at the .05 level. Moreover, after 2 weeks, students did the English vocabulary test again to examine the students' retention test of English vocabulary. The retention test mean score was 33.00 or 82.5%, when compared to the posttest mean score, 32.38 or 80.94% showing the retention of English vocabulary learning using communicative language teaching and semantic mapping. In addition, the mean score on the students' attitude questionnaire towards teaching English vocabulary using communicative language teaching and semantic mapping was 4.47, interpreted as "good", revealing that the students had positive attitudes towards teaching English vocabulary using communicative language teaching and semantic mapping.

9. Recommendations

The researcher proposes the following recommendations:

9.1 Semantic mapping is recommended for teachers to apply to teaching English vocabulary to primary school level.

9.2 Teaching English vocabulary using communicative language teaching and semantic mapping should be adapted for learning and teaching English vocabulary activities.

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The Research of Photogrammetry to Generate a Virtual Twin Art Exhibition of King Bhumibol Statues

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Abstract

This mixed-methods research aimed to: 1) investigate photogrammetry as a method for 3D scanning art statues of King Bhumibol for use in a virtual reality art exhibition (virtual twin art exhibition); 2) develop a virtual twin art exhibition based on the photogrammetry models; and 3) evaluate the efficacy and viewer satisfaction of the virtual twin art exhibition. Through interviews with experts in the fields of art, design, and technology, photogrammetry was chosen as the method for 3D scanning the statues. The samples were collected from forty-five individuals who attended the exhibition. Virtual reality art exhibition innovation from photogrammetry, an in-depth interview, a survey designed to gauge the level of consumer satisfaction, and an innovation assessment were among the research instruments. An examination of the data's content was performed on the qualitative information. According to the findings, 3D photogrammetry can be used to produce a realistic and immersive virtual art exhibition. This was demonstrated by the study's findings. The specialists came to the conclusion that innovation should be rated at the highest possible level across the board. Finally, their satisfaction with the innovation was also at the highest level. The study serves as a possibility for conducting art exhibitions via virtual twins during the pandemic, as it provides a high level of immersion and a realistic experience without the need to physically attend the exhibition venue.

Keywords: Virtual twin art exhibition, Virtual reality art exhibition, 3D scanning with photogrammetry, King Bhumibol statues

1. Introduction

According to the WHO, there are signs that the Corona virus predominantly diffuses between individuals in close contact, usually within 1 meter. People can be infected by inhaling or coming directly into contact with nasal, eye, or mouth aerosols and droplets harboring the virus (WHO, 2021). Art venues could accommodate numerous guests at once before the emergence of the pandemic. This is especially true with well-known art museums, which can be overcrowded. Since this pandemic has spread, many museums of art, galleries, and art exhibitions have been compelled to close their doors in fear of the lethal virus. In this difficult scenario, social distance must be practiced to be safe and to limit the danger of infection. This has a major effect on the landscape of art. Over 85,000 art institutions have closed since the epidemic, which accounts for 90% of the closures (Guterres, 2020).



However, to cope with this uneasy situation in the art world, there may be a sustainable solution for art exhibitions—one that involves virtual reality. Virtual reality is said to be flourishing despite the rise of the pandemic (Diez, 2021). According to the article, "Virtual Reality Will Be a Part of The Post-Pandemic Built World," VR is part of our pop culture. The spike in remote work due to the pandemic means that people are more geographically independent. Virtual reality could be used to bridge the gap, providing an alternative method of art viewing.

One of the researchers, Assistant Professor Dr. Gomesh Karnchanapayap, has produced a total of nine bronze statues reflecting the royal duties that the late King Bhumibol Adulyadej performed throughout his reign. The sculptures served as the primary content of this study's investigation. In order to turn these physical bronze statues into their realistic counterparts, the researchers relied on photogrammetry. Albrecht Meydenbauer, a German architect, is credited with being the one who first used the phrase "photogrammetry" (Meydenbauer, 1867). Photogrammetry employs techniques from numerous disciplines, such as optics and projective geometry. Digital picture capture and photogrammetric processing contain multiple well-defined processes that result in the development of 2D or 3D digital representations of the object (Suziedelyte-Visockiene et al, 2015).

Researchers will be able to recreate digital bronze statues that are identical to their physical counterparts using photogrammetry. This has the potential to construct a safe and effective virtual exhibition, especially during pandemics.

2. Research Objectives

This research consisted of three objectives:

- 1) investigate photogrammetry as a method for 3D scanning art statues of King Rama IX for use in a virtual reality art exhibition (virtual twin exhibition);
- 2) create an innovative virtual twin art exhibition based on the photogrammetry models; and
- 3) assess the viewer satisfaction of the virtual twin art exhibition.

3. Research Methodology

3.1 Samples

Using photogrammetry, nine bronze statues depicting King Bhumibol and his majesty's royal duties were employed to recreate their digital counterparts. The samples comprised of forty-five attendees of an exhibition. The samples were selected using the approach of volunteer sampling. Participants were those who 1) have an interest in King Bhumibol Adulyadej's royal duties. 2) would like to experiment with a new method of viewing art exhibitions. The exhibition was held at the Erabica Art Gallery at 36/1 Rangkasem Road, Tambol Nai Wieng, Amphoe Meung, Nan Province, on November 5, 2022.

3.2 Research Instruments

The research tools included a virtual reality art exhibition innovation created using a photogrammetry technique, an expert interview, an innovation evaluation form, and a satisfaction form. Content analysis was used to examine qualitative data.



3.3 Data Collection

The following were the steps in data collection. The methods for developing the research tools were discussed as follows:

3.3.1 Three experts in the fields of art, design, and technology were asked to come to a structured interview session to share their insights about how photogrammetry could be used to make virtual art objects based on their real-world counterparts.

3.3.2 The virtual reality exhibition from photogrammetry was shown at the show, and then attendees filled out a questionnaire about how well it worked as a possible alternative to a physical exhibition and how satisfied they were with what they experienced.

3.4 Data Analysis

The expert interview sessions were analyzed to identify which photogrammetry method is most suited for creating digital models of bronze statues. Three experts assessed the innovation's validity, and its IOC was 0.90. For the development of a suitable innovation, consideration was given to the feedback supplied by specialists. In addition, three experts with an IOC of 0.85 evaluated the validity of the customer satisfaction survey. When the audience has experienced the virtual exhibition, the researchers examine the questionnaires to assess the innovation's efficacy and audience satisfaction.

3.5 Ethical Considerations of Human Research

This article is a report of the research entitled "Virtual Reality as an Emerging Art Exhibition Platform in the Age of Pandemic," which has been authorized by the Ethics Review Board of Rangsit University and assigned the approval number RSUERB2021-053 on its Certificate of Approval.

4. Research Results

According to the three research objectives, the results are presented: 1) photogrammetry as a method for 3D scanning art statues of King Bhumibol for use in a virtual reality art exhibition; 2) the development process of the virtual twin art; and 3) the effectiveness and audience satisfaction.

4.1 Photogrammetry as 3D scanning solution to be used for virtual reality exhibition

The researchers conducted in-depth interviews with experts in three areas: Assistant Professor Thammasak Aueragsakul, an experienced digital artist and faculty member at Digital Arts Rangsit University; Assistant Professor Paniti Keowsawat, a technology expert at the Faculty of Information Technology Phetchaburi Rajabhat University; and Professor Wattana Jutavipard, a renowned designer. The researchers then decided to study the process of photogrammetry in detail and came to conclusions on the hardware and software needed to develop and deploy the virtual exhibition innovation.

4.1.1 The camera for photogrammetry

The researchers utilized the Canon EOS 5D Mark III (Figure 1), which features a full-frame sensor with 22.3 megapixels. This camera model's ISO sensitivity ranges from 100 to 25,600 and can be expanded to 102,400, making it



acceptable for the activities required by this research. The primary lens used in this study was EF Mount L-Series Lens/Full-Frame Format shown in Figure 2.

Figure 1

Canon EOS 5D Mark III



Figure 2

Canon EF 35mm f1.4L II USM



4.1.2 The software for photogrammetry

While there are many photogrammetry programs in the market, one of the leading software is RealityCapture by Epic Games as it comes equipped with all necessary features. Image registration (alignment), automatic calibration, polygon mesh calculation, coloring, texturing, parallel projections, georeferencing, DSM, coordinate system conversion, simplification, scaling, filtration, smoothing, measurement, inspection, and multiple exports and imports are among its features (CapturingReality, 2022). Thus, the researchers chose the software for this study. The researcher relied on Autodesk Maya for UV editing. Maxon ZBrush was utilized for editing model forms. Adobe Lightroom was used for photo adjustments. Adobe Photoshop was used for texture editing.

4.1.3 The software for creating virtual exhibition

The researchers chose the Unreal Engine, which is free and can export content for viewing in a virtual reality headset, to create a virtual exhibition experience. The version used in this research is Unreal Engine 5.1.

4.1.4 The hardware to run the virtual exhibition

The researchers ran the study on a 64-bit version of Windows 10 with 16 GB of RAM and an nVidia GeForce GTX 1080 graphics card. The personal computer is a VR-ready notebook, which means it can play the experience via a virtual reality head-mounted display. The virtual reality headset used for this study was Oculus Rift-S.

4.2 The Photogrammetry Process

To acquire the best photogrammetry results possible, the following steps were taken.

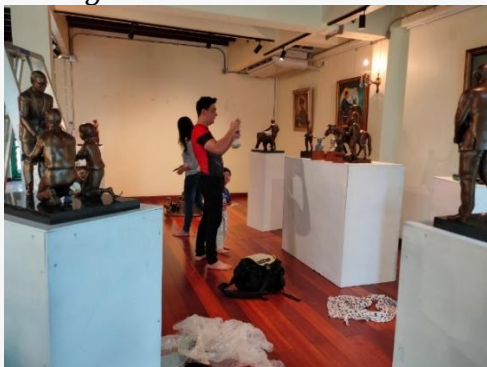
4.2.1 Placing Sculptures in the exhibition setting



Placing the sculptures in position, according to the actual exhibition plan, with complete lighting, so that when the models are scanned using photogrammetry, they will have the correct light and shadow (Figure 3-4).

Figure 3

Placing bronze statues I



Note. Asst.Prof.Dr.Gomesh Karnchanapa yap begins putting statues in place at Erabica Art Gallery on 18th January 2022. Own work.

Figure 4

Placing bronze statues II



Note. Piyanon Somboon checks on the lightings of the exhibition at Erabica Art Gallery on 18th January 2022. Own work.

4.2.2 Assess complexity of the object to photogrammetry

The planning of photogrammetry is influenced by both the exhibition's format and its art works. For this study, researchers categorized as follows:

1. Environment and exhibition space

The researchers must take photographs of the entire surrounding space, including the floor, walls, paintings on the wall, and ceiling, which will then be digitally reproduced.

2. Bronze sculptures

Each piece of sculpture on show has a varied level of complexity, which can be categorized as low, medium, and high complexity sculptures.

Low complexity sculptures are works with objects or figures fewer than two. There are four sculptures in this category. "The White Elephant and the King" (Figure 5) depicts King Rama IX petting the juvenile royal white elephant. "Mother's Teachings" (Figure 6) depicts Somdet Phra Srinagarindra Boromarajajonani, the King's mother, cutting King Rama IX's hair.

Figure 5

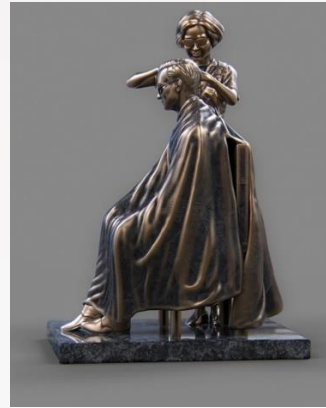
"The White Elephant and the King"

Figure 6

"Mother's Teachings"



Note. Bronze statue created by Asst.Prof. Dr. Gomesh Karnchanapayap. Own work.



Note. Bronze statue created by Asst.Prof. Dr. Gomesh Karnchanapayap. Own work.

"Two Dharma Kings" (Figure 7) depicts King Rama IX walking alongside the 19th Supreme Patriarch of Thailand. "Bodhi of the Land" (Figure 8) depicts a seated King Rama IX planting a Bodhi sapling on the ground in the shape of a map of Thailand.

Figure 7
"Two Dharma Kings"



Note. Bronze statue created by Asst.Prof. Dr. Gomesh Karnchanapayap. Own work.

Figure 8
"Bodhi of the Land"



Note. Bronze statue created by Asst.Prof. Dr. Gomesh Karnchanapayap. Own work.

Medium complexity sculptures are works with three objects or figures. There are two sculptures in this category. "Gifts from the Sky" (Figure 9) depicts King Rama IX handing a notebook to a young schoolgirl who positions herself next to a teacher holding a royal gift bag. "The great king" (Figure 10) is a set of three bust statues of King Rama IX with wooden bases.

Figure 9
"Gifts from the Sky"

Figure 10
"The Great King"



Note. Bronze statue created by Asst.Prof. Dr. Gomesh Karnchanapayap. Own work.



Note. Bronze statue created by Asst.Prof. Dr. Gomesh Karnchanapayap. Own work.

High complexity sculptures contain more than three objects or figures. There are three sculptures in this category. "The King's Happiness" (Figure 11) depicts the royal family; King Rama IX, Queen Sirikit, Princess Ubolratana Rajakanya, and Prince Vajiralongkorn —in a Disney ride. "Protector of the Land" (Figure 12) depicts King Bhumibol Adulyadej seated on a mule, with the hill tribe leader walking ahead. There are courtiers on both the left and right sides.

Figure 11
"The King's Happiness"



Note. Bronze statue created by Asst.Prof. Dr. Gomesh Karnchanapayap. Own work.

Figure 12
"Protector of the Land"



Note. Bronze statue created by Asst.Prof. Dr. Gomesh Karnchanapayap. Own work.

"Regalis Vehiculum" (Figures 13 and 14) displays His Majesty King Bhumibol Adulyadej the Great Borommanatbophit squatting and leaning on the left side of the Royal Land Rover Series III or "Series Three" Long Wheel Base model, with a villager squatting and providing information. Two courtiers sat in front of the royal car, while a royal guard positioned on the right side of the vehicle.

Figure 13
Front view of "Regalis Vehiculum"

Figure 14
Opposing view of "Regalis Vehiculum"



Note. Bronze statue created by Asst.Prof. Dr. Gomesh Karnchanapayap. Own work.



Note. Bronze statue created by Asst.Prof. Dr. Gomesh Karnchanapayap. Own work.

4.2.3 Photographing the bronze sculptures

The images in this research were captured with a 35mm lens with an aperture range of F8–F11 and a tripod to prevent camera shake. Avoid using a high ISO level to brighten the image, since this can increase digital noise and diminish image detail. The White Balance setting should not be set to "Auto," as it may result in varying color temperatures in each photograph. RAW files are image data captured by the camera's image sensor without compression or reduction, resulting in high-quality images that take advantage of the camera's capability to the fullest extent. See Figure 15. for the camera settings.

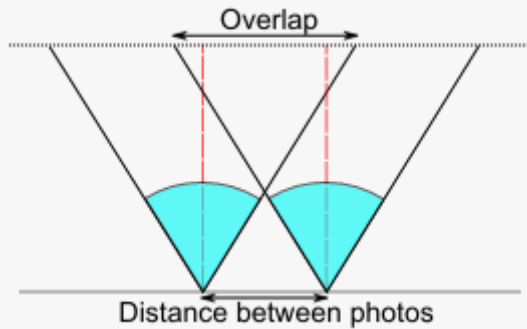
Figure 15
Camera Setting.



As seen in Figure 16, photography must be taken around the sides of the object and overlap each other. To avoid depth of field, the photographer must not adjust the focal length throughout the entire session

Figure 16
Overlap shooting diagram.

Figure 17



Note. The diagram depicting a guide for shooting an object by overlapping corners. From www.drewsilcock.co.uk, by Drew Silcock, 2014.

Guide for shooting photogrammetry



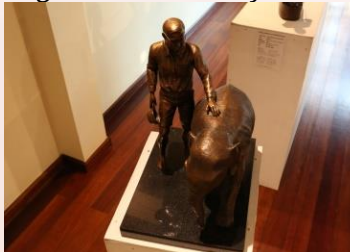
Note. The diagram depicting a guide for shooting an object at different angles and all around the object. From *Photogrammetry - Advanced Capture*, by CINE Communities. (n.d.)

The following are extra factors to consider when capturing photographs (Figure 17).

1. The photographer must capture each side of the object from three separate perspectives: above the object, parallel to the object, and below the object.
2. Shoot in a complete circle with the subject at the center, overlapping the previous image by approximately 50 percent.
3. Take close-up photographs to capture the object's fine details.

Figure 18

Photograph of "The White Elephant and the King" taken from the angle above the object



Note. Photo taken at Erabica Art Gallery on 18th January 2022. Own work.

Figure 19

Photograph of "The White Elephant and the King" taken from the angle parallel to the object



Note. Photo taken at Erabica Art Gallery on 18th January 2022. Own work.

Figure 20

Photograph of "The White Elephant and the King" taken from the angle below the object



Note. Photo taken at Erabica Art Gallery on 18th January 2022. Own work.

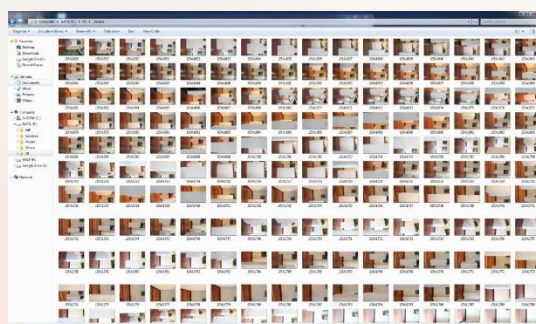


Figures 18-20 depict three different shooting angles from one side of an object. Taking the complexity of the object into consideration, the photographer should take as many images as possible from all sides so that the program can efficiently calculate the surface. For the environment, the researchers must take the entire surrounding area of the exhibition of 2,171 shots. The entire project requires a total of 3,391 photos (Figure 21). Table 1 shows the number of photos for each sculpture and the exhibition environment.

*Table 1
Number of photos for the photogrammetry process and complexity of sculpture*

Sculpture Title	Complexity	Above	Parallel	Below	Close-up	Total
The White Elephant and the King	Low	16	20	13	36	85
Mother's Teachings	Low	15	20	23	28	86
Two Dharma Kings	Medium	23	35	17	26	101
Bodhi of the Land	Medium	34	25	15	29	103
Gifts from the Sky	Medium	22	35	42	27	126
The Great King	Medium	46	47	56	28	177
The King's Happiness	High	24	37	42	39	142
Regalis Vehiculum	High	40	36	53	69	198
Protector of the Land	High	44	42	45	71	202
Total						1220

Figure 21
Photos used in the photogrammetry project



Note. 3,391 photos were taken for the photogrammetry. Own work.

Figure 22
Shadow and Highlight adjustment



Note. Adjustments done in Adobe Light Room. Own work.

4.2.4 Adjust the photographs

In order to see the intricacies of both the dark and bright areas of the image, reduce shadow and highlight in all photos using the photo editing software as shown in Figure 22.



4.2.5 Create 3D models with RealityCapture

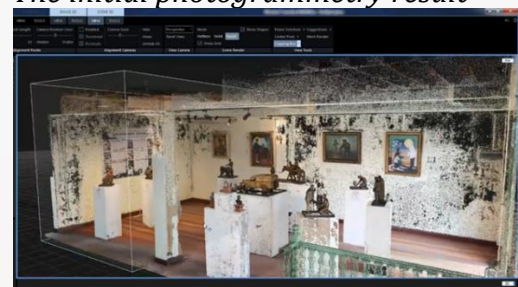
Importing all photos into the RealityCapture application is the next step. Two sets of photographs must be imported: the set to be processed as a model and the set to be processed as a texture. Put them in separate files and give them the following names: "_geometry" and "_texture" as indicated in Figure 23, so that the application can identify which group of photos is for 3D model processing. Both image sets are similar, but the "_geometry" set contains photos with shadow and highlight adjustments, as shown in Figure 24, to improve the performance of the model computation algorithm.

Figure 23
Folder naming conventions



Note. Folders were named “_geometry” and “-texture” respectively.

Figure 24
The initial photogrammetry result



Note. The generated models are often partially imperfect and contain opening faces shown in black. Own work.

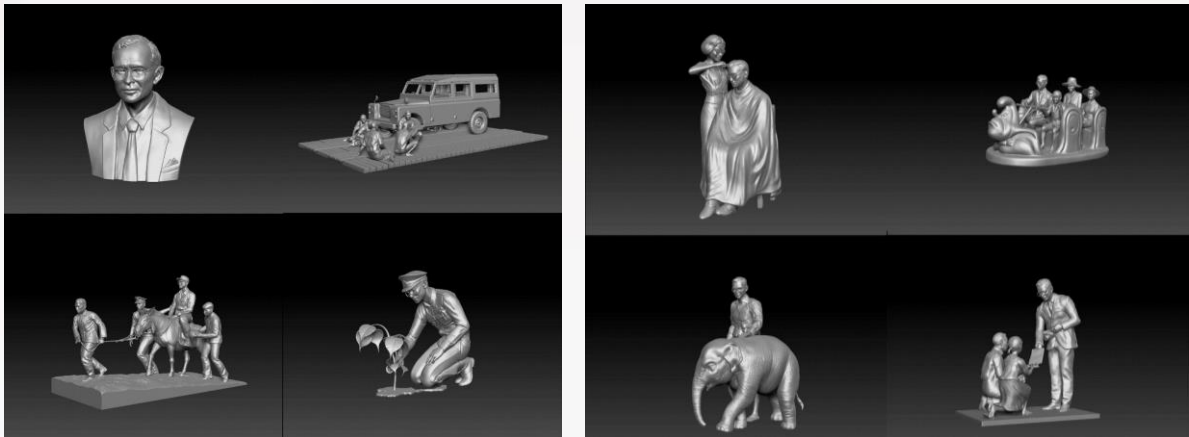
4.2.6 Initial results from RealityCapture

CaptureReality relied on the numerous photos to create 3D models, the results often contain imperfections such as holes which are shown in black (Figure 24).

4.2.7 Improve the photogrammetry model quality

Due of the imperfect outputs of photogrammetry, the models cannot be utilized directly. Therefore, the researchers must modify the model in the Zbrush program. To be reused in RealityCapture again, the model's exported coordinates must remain unchanged. Figure 25 displays the outcomes of the revised models.

Figure 25
Models which have been amended in ZBrush

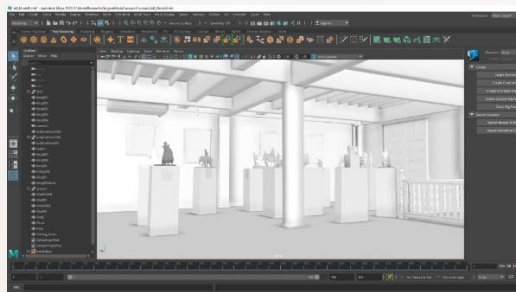


Note. Maxon ZBrush was used to correct imperfections from photogrammetry. Own work.

4.2.8 Create UV and texture for the photogrammetry models

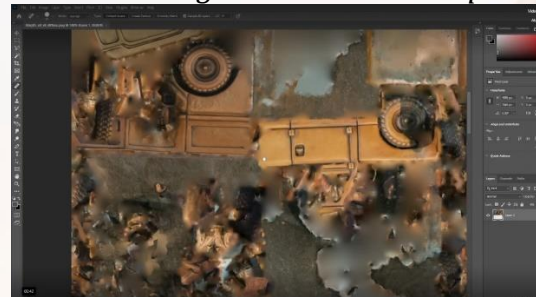
Researchers unwrapped UV in Maya (Figure 26) and transferred it back to texture in RealityCapture. Again, some of the textures were poor, requiring some Photoshop editing (Figure 27). The Maya scene which has been fixed is shown in figure 28.

Figure 26
Scene UV editing in Autodesk Maya



Note. Screenshot directly in Autodesk Maya. Own work.

Figure 27
Texture editing in Adobe Photoshop



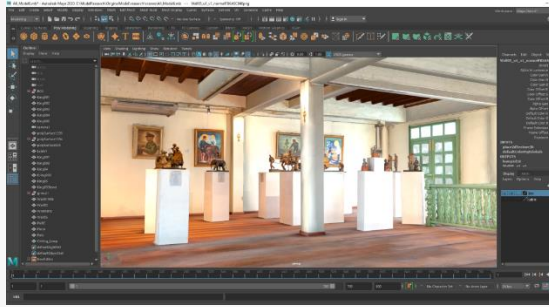
Note. Screenshot directly in Adobe Photoshop. Own work.

4.2.9 Assemble the virtual reality experience

Take all models and textures in Maya and export them to Unreal Engine 5.1 as OBJ files. By placing all models in a scene and configuring the model's position and size to match the physical exhibition as closely as possible, we will achieve the realistic VR viewing experience possible as virtual twin exhibition (Figure 29).

Figure 28
Fully edited scene in Maya

Figure 29
Virtual twin exhibition in Unreal Engine



Note. Screenshot directly in Autodesk Maya. Own work.



Note. Screenshot directly in Unreal Engine Own work.

4.2.10 The exhibition

The researchers held the exhibition on 5th November 2022 on the upper floor of the Erabica Art Gallery. The opening ceremony was presided by the Governor of Nan province (Figure 30). Figure 31 depicts how an audience experience the virtual exhibition by donning a VR head-mounted display tethered to the notebook.

Figure 30

The governor of Nan Province (third from left) presides over the opening of the exhibition



Figure 31

Piyanon Somboon assists the audience viewing the VR exhibition



4.3 Efficacy and viewer satisfaction of King Bhumibol' virtual twin exhibition

4.3.1 Statistical data of the samples

The personal information of the samples is shown in Table 1 below:

Table 2

Personal information of the samples



No.	Personal Information	Frequency (n=45)	Percentage (%)
1	Sex		
	Male	24	53.3
	Female	22	48.9
2	Age range		
	15-20	14	31.1
	21-30	7	15.5
	31-40	6	13.3
	41-50	12	26.6
	51-60	4	8.8
	61-70	1	2.2
	>70	1	2.2

As shown in Table 2, 53.3% of the 45 people that attended the exhibition were males, while 48.9% were females. Attendees ranged in age from 15 to 20 years old (31.1%), 41 to 50 years old (26.6%), 21 to 30 years old (15.5%), 31 to 40 years old (13.3%), 51 to 60 years old (8.8%), 61 to 70 years old and older than 70 years old are tied (2.2%).

4.3.2 Ease of viewing the virtual twin exhibition

The researcher used a Likert scale to assess the opinions of the samples regarding the simplicity of viewing the virtual display. 21 participants (46.7%) chose "easy to use", 18 participants (40%) selected "very easy to use", and 6 participants (13.3%) voted "neutral" as shown in Table 3.

Table 3
Ease of viewing the virtual exhibition

Likert Scale	Frequency (n=45)	Percentage (%)
Extremely difficult to use	0	0
Difficult to use	0	0
Neutral	6	13.3
Easy to use	21	46.7
Extremely easy to use	18	40

4.3.3 Level of immersion while viewing the virtual twin exhibition

The researcher used a Likert scale to assess the opinions of the samples regarding how immersive the virtual exhibition comparing to actual physical exhibition. 23 participants (51.1%) chose "highly immersive", 18 participants (40%) selected "immersive", and 4 participants (8.9%) voted "neutral" as shown in Table 4.

Table 4
Levels of Immersion while viewing the virtual exhibition



Likert Scale	Frequency (n=45)	Percentage (%)
Extremely immersive	0	0
Not immersive	0	0
Neutral	4	8.9
Immersive	18	40
Highly immersive	23	51.1

4.3.4 Satisfaction level toward the virtual twin exhibition

The researcher used a Likert scale to assess the opinions of the samples regarding their satisfaction level toward the virtual exhibition. 28 participants (62.2%) chose "extremely satisfied", and 17 participants (37.8%) selected "satisfied" as shown in Table 5.

*Table 5
Levels of Satisfaction after viewing the virtual exhibition*

Likert Scale	Frequency (n=45)	Percentage (%)
+	0	0
Dissatisfied	0	0
Neutral	0	0
Satisfied	17	37.8
Extremely Satisfied	28	62.2

The table above indicates that the samples' satisfaction with the innovation was between satisfied and extremely satisfied.

4.3.5 Expert opinions

In order to get their thoughts on how photogrammetry was used in this research, three experts in the disciplines of art, design, and technology were invited to a structured interview session. The art expert sees this as a new medium for expression and a way to discuss and compare exhibitions. The design expert believes that the photogrammetry-based virtual display provides an experience that is as natural to the viewer as that of a physical exhibition. Table 3 displays survey responses regarding perceived ease of use; this expert's view confirms those responses. It is possible, the technology expert adds, that this method will replace traditional methods of displaying digital replicas of tangible works of art. The virtual exhibition is a safe option for showing artwork without contracting COVID-19, according to all experts.

5. Discussion

The following points were revealed in light of the research findings:

5.1 The photogrammetry approach to digital recreation of an art sculpture



Due to the following constraints, the photometry scanning of the model yielded data that must be adjusted by hand.

5.1.1 This investigation was conducted inside a building with somewhat low lighting, necessitating camera settings with a wider aperture and slower shutter speed than ideal, resulting in numerous fuzzy photographs. The application may identify blurry photographs as defective. Consequently, good lighting could be useful in order to shoot photographs with sufficient light.

5.1.2 The exhibition took place in a commercial facility, therefore the research team had limited time to capture photographs. If there had been more time, the researchers could have reviewed the outcomes of past picture sessions and taken additional images.

5.1.3 There should be a device to assist in taking photographs from above the object, as several sculptures and other objects were placed quite high. Using a drone equipped with a high-resolution camera could enhance the photogrammetry process.

5.1.4 Due to space constraints, the artworks were positioned closely together. This makes it pretty difficult to photograph the work item from all sides. The results would be improved if the sculptures were separated from one another by additional space.

5.2 The efficacy of the virtual exhibition from photogrammetry

The researchers asked the exhibition attendees to view sculptures in the virtual exhibition. Upon completion of the viewing, they were asked about their satisfaction level with the experience. The results are unanimous, as shown in Table 5: 62.2% of attendees voted highly satisfied, while 37.8% voted satisfied. Not only was the satisfaction level voted extremely high, but 91.1% of the audience also thought the 3D sculptures within the virtual exhibition were immersive and highly immersive, as shown in Table 4.

5.3 Virtual exhibition from photogrammetry as a solution for the pandemic

Both the survey findings regarding viewing immersion (Table 4) and the opinions of experts show that the photogrammetry virtual exhibition can be utilized as an alternative to physically attending an art exhibition.

6. Conclusion

To create a digital model from a physical counterpart, current photogrammetry is neither entirely automatic nor accurate, but it can serve as a basis for building photo-realistic models. This research showed that photogrammetry could be done in a methodical, time-saving way that yet produced accurate findings. You need the right tools, software, and strategies to get the job done effectively. Most significantly is the quality of the photographs used for creating 3d and texturing. Hence, knowing what cameras and equipment to use, what settings to apply, and how to fix the photographs are paramount. After the model has been created using photogrammetry, it needs undergo model amendment in order to enhance its quality. The scanned models and environment can then be generated as an immersive virtual twin exhibition. During the



pandemic, the virtual twin exhibition might be utilized as an alternative venue for art exhibitions that provides safety and accessibility for its audience.

7. Recommendations

Photogrammetry can be applied in a variety of situations, such as the creation of new innovations and the examination of various locales. Through geographic analysis and the examination of other photographic data, the technique can also be utilized to discover crucial information in the context of study. It can be applied to a natural region in order to investigate the alterations that have occurred throughout time.

8. About the authors

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Factors Affecting Farmer's Satisfaction via Agricultural Extension of the Longan Collaborative Farming Project in Lamphun Province, Thailand

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Abstract

Encouraging the collaboration among farmers growing longan in Lamphun province to strengthen the potential of productivity via the value chain through the agricultural extension of the longan collaborative farming project has been carried on for almost half a decade. However, the current economic volatility has resulted in the lack of sustainability of the longan collaborative farms in Lamphun province. The objectives of this research were to study the level of farmers' satisfaction with the agricultural extension of the longan collaborative farming project and to analyze the influential factors in this satisfaction in Lamphun province. The data were collected by structured interviews among 216 farmer members of longan collaborative farms in Lamphun and were analyzed by descriptive statistics, and multiple regression analysis. The study found that the farmer members involved in this project were moderately satisfied with the outcome at the level of $\bar{x}=3.40$. The aspect with the highest average satisfaction is the support from the longan collaborative farming project at the level of $\bar{x}=3.53$, followed by the goals of the longan collaborative farming project at the level of $\bar{x}=3.35$ and agricultural officer's performance at the level of $\bar{x}=3.32$, respectively. The positive affecting factors on satisfaction at a statistically significant level of 0.05 are age, longan production plan, number of longan distribution sources, holding a position in longan collaborative farms, and number of agricultural organization membership. The negative affecting factors are number of land holdings for longan production, and number of workers employed. The results of this study provided the guidelines for strengthening the group of longan collaborative farms based on the importance of increasing the proficiency of agricultural extension staff in supporting longan production according to the federal policy of the collaborative farming project.

Keywords: Farmer's satisfaction, Agricultural extension, The collaborative farming project

1. Introduction

The agricultural sector in Thailand is still confronting many problems and challenges such as the inaccessibility of most farmers to obtain accurate and necessary information, and no ownership of land or some part of it. Therefore, farmers have no incentive to invest in any effort to improve production efficiency, resulting in low production efficiency and improper use of inputs (Office of Agricultural Economics, 2017; Chantharat et al., 2018). It is also indicated that



several cash crops are grown in the areas classified as 'slightly suitable' or 'unsuitable', resulting in low productivity and high production costs with low return or loss (Land Development Department, 2019). Agricultural production is also affected by global climate change, where higher temperatures may cause the spread of more weeds and pests (Meteorological Department, 2020). In addition, smallholder farmers also lack economies of scale, lack bargaining power in the market system, and have limited access to modern technology (Attavanich et al., 2019). Thailand's agricultural sector has also been affected by the vulnerability or volatility of the global economy. External factors such as crude oil price and exchange rate can affect agricultural production, so do internal factors like the Thai economy, water situation, and pests (Department of Internal Trade, 2020). Moreover, agricultural household debts tend to increase (Bureau of Agricultural Economic Research, 2020). It was also observed that few numbers of new generations inherited agricultural occupations, whereas the farming population is getting older as the country is becoming an aging society. This situation will affect the quality and quantity of labor and can deteriorate the financial stability of Thai households (Bank of Thailand, 2018).

As agricultural production is in a rapidly changing context with higher production costs, and agricultural marketing is highly competitive in terms of quantity and quality, smallholder farmers increasingly encountered the problems regarding production and distribution of agricultural products. Ministry of Agriculture and Cooperatives, therefore, launched a 'collaborative farming' project in 2016 to solve such problems. The Department of Agricultural Extension is the main agency implementing this project across the country via its district and provincial agricultural offices. It also works collaboratively with other relevant agencies such as Provincial Cooperative Office, Provincial Land Development Station, Provincial Irrigation Project, and Provincial Commercial Office. In 2021, there were 8,181 farms participating in the collaborative farming project with 494,441 farmers, and 6,476,505 Rai of farmland. The collaborative farming project covers 11 agricultural product categories including rice, field crops, perennials, vegetables/herbs, fruit/perennial plants, mulberry, ornamental flowers, livestock, economic insects, and others (Department of Agricultural Extension, 2021).

Lamphun Province is one of the important agricultural areas in the upper northern region. There are 687,123 Rai of agricultural area (24.40 % of the total land area) with 59,886 farm households. Most farm households grow fruit/perennial plants, followed by rice and field crops (Lamphun Provincial Agriculture and Cooperative Office, 2021). According to Department of Internal Trade (2020), longan is an important economic crop in the province with 348,570 Rai of plantation area, which is the largest compared to other crops' production area. In addition, longan also generates the highest revenue the province, followed by in-season rice, maize, and mango (Lamphun Provincial Agricultural Extension Office, 2020). Lamphun Province has implemented the collaborative farming project since 2016. In 2021, there were 74 collaborative farms with 4,127 farmers and 39,066.50 Rai of farmland. The collaborative farms produce 11 types of agricultural products including rice, maize, longan, native chicken, potato, dairy cow, bee, garlic, vegetable/herb, rubber, and mango (Department of Agricultural Extension, 2021) The collaborative farming project in Lamphun province has two



main activities: (1) management of the project under the responsibility of Lamphun Provincial Agricultural Extension Office and its district agricultural offices, working collaboratively with all departments in Ministry of Agriculture and Cooperatives and using the Training and Visit (T&V) System for extension activities, (2) management of collaborative farms by boosting the capacities of chairpersons of collaborative farms to be able to manage the farms, including knowledge and skill development in production planning and market-oriented production (Lamphun Provincial Agricultural Extension Office, 2020). As for longan, Lamphun province had 40 longan collaborative farms in 2020, which are the highest number in Thailand. The longan collaborative farms are located in all districts with 2,327 participating farmers and 15,663 Rai of plantation area. The Lamphun Provincial Agricultural Extension Office and its district agricultural offices carried out activities together with the collaborative farmers' members to achieve production cost reduction, productivity improvement, and development in quality, marketing, and management. To implement the relevant activities, The Lamphun Provincial Agricultural Extension Office and its district agricultural offices work with various government agencies and educational institutions in the area, such as Maejo Longan Research and Development Center, Lamphun Land Development Station, and Lamphun Provincial Irrigation Project (Lamphun Provincial Agricultural Extension Office, 2020).

However, the operation of longan collaborative farms in Lamphun province achieves limited success. An evaluation of the longan collaborative farming project in the province indicates that in the year 2020, of 40 collaborative farms, only six (15 %) earned an A grade (Lamphun Provincial Agricultural Extension Office, 2020). Longan collaborative farms still encountered many problems such as the lack of effective management (Lamphun Provincial Agricultural Extension Office, 2020), low adoption of production technology (Mingmongkonsasithorn et al., 2019; Thammakhunkaew et al., 2021), and lack of marketing linkage with cooperatives and private sector (Lamphun Provincial Cooperative Office, 2019). Moreover, the operations of departments under Ministry of Agriculture and Cooperatives lack integration and have different budget allocation timeframes (Lamphun Provincial Agricultural Extension Office, 2020). In addition, there is another method that will make longan collaborative farms successful or sustainable, namely satisfaction assessment. Satisfaction with the distribution of benefits across beneficiaries and the collaborative participants is one of the indicators for productivity performance dimensions in "Collaborative Governance" which shows the fairness in the distribution of benefits, costs, and risks among beneficiaries of actions (Emerson & Nabatchi, 2015). The results will be directly reflected by the farmer members about the extension of longan collaborative farms. Therefore, the following 3 aspects and the relevant affecting factors of farmer's satisfaction via agricultural extension of the longan collaborative farming project in Lamphun province must be seriously addressed and studied: (1) support from the longan collaborative farming project, (2) the agricultural officer's performance, and (3) the goals of the longan collaborative farming project (Department of Agricultural Extension, 2021). The results of the study will help raise the level of agricultural extension for the longan collaborative farms and develop the potential of longan collaborative farms in Lamphun province. In addition, it can also be used as a



guideline for managing the agricultural extension of longan collaborative farms in other provinces, including other types of products.

2. Research Objectives

2.1 To study the level of farmer's satisfaction via agricultural extension of the longan collaborative farming project in Lamphun province, Thailand

2.2 To analyze the factors affecting farmer's satisfaction via agricultural extension of the longan collaborative farming project in Lamphun province, Thailand

3. Research Methodology

3.1 Population and samples

The population in this study was the farmer members from the selected longan collaborative farms in Lamphun province, Thailand. The method of multi-stage sampling was employed to collect a sample set consisting of the following four steps.

1) A purposive technique was used to select sampled districts where the top 5 most longan plantation districts out of 8 districts were included for this study, which are Li, Pa Sang, Mae Tha, Mueang Lamphun, and Ban Hong. These five selected districts cover 85.84 % of the longan plantation area in the province.

2) A purposive technique was used to select longan collaborative farms from the selected five districts based on the following attributes: group size, year of establishment, and production type (in/off-season). In total, 11 longan collaborative farms were chosen, which are 5 longan collaborative farms in Li, 2 longan collaborative farms in Pa Sang and Mae Tha, and 1 longan collaborative farm in Mueang Lamphun and Ban Hong.

3) Based on the sampling method, there is a total of 1,218 farmer members. Unfortunately, this number is rather high for practically collecting the informative data. Thus, the technique of G*Power program is used to calculate the sample size with effect size conventions ($f^2=0.15$), α err prob=0.05, power ($1-\beta$ err prob) =0.95, and the number of predictions=16. Thus, the sample size of 1,218 is reduced to 204 samples. To gain more informative data to reduce the discrepancy in data analysis, 12 additional samples are included, making the total sample size equal to 216 (Faul et al., 2009).

4) For each selected collaborative farm, a simple random sampling was used to identify individual farmer for data collection.

3.2 Research Instruments and Data Collection

The instrument used is a structured questionnaire asking about the factors affecting farmer's satisfaction with agricultural extension of the longan collaborative farming project in Lamphun province, Thailand. The questionnaire consists of 3 aspects: (1) support from the longan collaborative farming project, (2) the agricultural officer's performance, and (3) the target of the longan collaborative farming project. Likert's scoring scheme (Likert, 1932) was adopted to evaluate each aspect, which is 5 = very satisfied; 4 = satisfied; 3 = neutral; 2 = dissatisfied; 1 = very dissatisfied. A structured interview was conducted by using an approved and tested questionnaire. The approved questionnaire was preliminarily tested on 30 tentative farmers, not the target samples, having similar



characteristics. Then, Cronbach’s alpha was applied to evaluate and analyze the reliability of the questionnaire. The total questions of 3 parts have Cronbach’s reliability value $\alpha = 0.716-0.814$ which is higher than the threshold value of 0.7 (Peterson, 1994; Taber, 2018; Hair et al., 1998). Hence, the questionnaire passed the test and could be used for collecting the data.

3.3 Data Analysis

Collected data were analyzed by using descriptive statistics such as frequency, mean, and percentage to explain personal characteristics with the weight mean score of Likert’s scoring scheme. The following 5 levels are defined: 1.00-1.80 = very dissatisfied; 1.81-2.60 = dissatisfied; 2.61-3.40 = neutral; 3.41-4.20 = satisfied; 4.21-5.00 = very satisfied. Applying multiple regression analysis to identify the primary independent variables motivating the farmer’s satisfaction on agricultural extension of the longan collaborative farming project was considered as the dependent factor. There are 16 independent variables which are (1) sex, (2) age, (3) education, (4) production plan, (5) number of lands used for production, (6) number of water sources, (7) number of workers employed, (8) number of technologies, (9) income, (10) number of distribution sources, (11) source of funds, (12) holding a longan collaborative farm position, (13) holding a social position, (14) number of agricultural organization membership, (15) number of information sources, and (16) number of communication channels. The dependent variable is the level of farmer’s satisfaction via agricultural extension of longan collaborative farming project considered.

4. Results

4.1 Level of Farmer’s revealed Satisfaction

The study found that the farmer members of longan collaborative farms in Lamphun have overall satisfaction via agricultural extension of the longan collaborative farming project were moderately satisfied (neutral) at the level of $\bar{x}=3.40$; support from the longan collaborative farming project at the level of $\bar{x}=3.53$; the goals of longan collaborative farming project at the level of $\bar{x}=3.35$; and the agricultural officer's performance at the level of $\bar{x}=3.32$, respectively. As shown in Table 1.

Table 1
Level of farmer’s satisfaction via agricultural extension of the longan collaborative farming project.

Aspects of farmer’s satisfaction (n=216)	$\bar{x} \pm S\bar{x}$	Level of satisfaction
1) Support from the longan collaborative farming project	3.52±0.061	satisfied
2) The Agricultural officer's performance	3.32±0.065	neutral
3) The goals of the longan collaborative farming project	3.35±0.062	neutral
Total	3.40±0.056	neutral



Note: 1.00-1.80 = very dissatisfied; 1.81-2.60 = dissatisfied; 2.61-3.40 = neutral; 3.41-4.20 = satisfied; 4.21-5.00 = very satisfied

4.2 Factors Affecting Farmer's Satisfaction

The results showed that the F value was significant at the level of 0.01. Therefore, at least one independent variable affects farmer's satisfaction with agricultural extension of the longan collaborative farming project in Lamphun province are statistically and significantly different at the level of 0.05, and all 16 independent variables could explain the variation of the dependent variable.

There are 7 influencing independent factors found from the analysis which can be classified into positive and negative satisfaction as follows. There are 5 positive factors which are age, longan production plan, number of longan distribution sources, holding a position in longan collaborative farms, and number of agricultural organization membership at the significant level of 0.05. But there are 2 negative factors which are number of land holdings for longan production, and number of workers employed at the significant level of 0.05. These 7 fundamental factors can influence the satisfaction of other circumstances was 47.20% ($R^2=0.472$) as summarized in Table 2. The results of the study can be explained and reviewed as follows.

1) Age. Increase age and increase satisfaction are congruent. One year increase age can additionally raise the level of satisfaction by 0.011 points.

2) Longan production plan. The in-season and off-season of longan production plan can additionally increase the level of satisfaction by 0.222 points.

3) Number of distribution sources. The longan distribution should have more than one source that can additionally be increased the level of satisfaction by 0.197 points.

4) Holding a longan collaborative farm position. Holding a position in longan collaborative farm can additionally increase the level of satisfaction by 0.441 points.

5) Number of agricultural organization membership. Being a member of one additional agricultural organization can additionally increase the level of satisfaction by 0.095 points.

6) Number of workers employed. Hiring one more employee can reduce the level of satisfaction by 0.013 points.

7) Number of lands used for production. Possessing additional land of size one rai can reduce the level of satisfaction by 0.007 points.

Table 2

Summary of the factors affecting the satisfaction and relevant statistical values from the analysis.



Independent variables	Statistics showing relationship between independent and dependent variables				Multicollinearity	
	B	β	t	Sig.	Tolerance	VIF
(Constant)	1.703	-	4.705	<.001**	-	-
1) Sex	.134	.082	1.367	.173	.744	1.344
2) Age	.011	.126	2.068	.040*	.715	1.398
3) Education	-.146	-	-	.193	.592	1.689
4) Production plan	.222	.087	1.307	.038*	.752	1.329
5) Number of lands used for production	-.007	-	-	.024*	.727	1.375
6) Number of water sources	.149	.137	2.266	.067	.739	1.353
7) Number of workers employed	-.013	-	-	.038*	.671	1.490
8) Number of technologies	.041	.131	2.086	.157	.665	1.503
9) Income	8.247E-07	.090	1.420	.157	.665	1.503
10) Number of distribution sources	.197	.115	1.762	.080	.627	1.594
11) Source of funds	-.056	.148	2.710	.007**	.887	1.128
12) Holding a longan collaborative farm position	.441	-	-.600	.549	.814	1.229
13) Holding a social position	.065	.034	3.488	.001**	.616	1.624
14) Number of agricultural organizations membership	.095	.039	.662	.509	.781	1.281
15) Number of information sources	.030	.062	.662	.509	.781	1.281
16) Number of communication channels	.090	.145	2.228	.027*	.627	1.595
	.030	.090	1.392	.165	.637	1.570
	.090	.139	1.963	.051	.526	1.902
R ² =.472 (47.20%)		SEE. = .620		F=11.122 (Sig.<.001)		

Note: * = having statistically significant at 0.05, ** = having a statistically significant at 0.01

5. Discussion

In terms of basic personal information, it was revealed that older farmers tend to increase their satisfaction in agricultural extension of the longan collaborative farming project. Getting older may reflect those farmers gained



more skills and experience in longan production, which help raise the level of longan production better. The finding confirmed the result reported by Chankreua & Chawalitthomrong, 2018. They reported that the increase age satisfied the career development project in accordance with the needs for drought alleviation of the community, Ratchaburi Province.

According to economic studies, it was found that planning in advance to produce longan both in-season and off-season increases the satisfaction with agricultural extension of the longan collaborative farming project. This may be the result of reducing the risk of product price volatility and climatic variability. The finding confirmed the result reported by Arruksomboon et al. (2020). They reported that farmers should apply a risk management program and risk management tools as a guide and a plan to prevent the risk of overcapacity in mango production of farmers in Chachoengsao province. Furthermore, having various longan distribution sources tends to increase the satisfaction with agricultural extension of the longan collaborative farming project. It may be the result of having the power to negotiate the price, more options to sell the products, and solution to oversupply of longan products in the market as previously studied by Leksuit & Pituratjarurnkoon (2020). They recommended the establishment of sustainable organic marketing networks in different areas in Lamphun province.

However, having many employees can cause a lot of expenses which obviously decreases the satisfaction on agricultural extension of the longan collaborative farming project. This may be a result of the current increase wages in the agricultural sector, bringing up the increase in production costs. Possessing a lot of land for longan production clearly affects the decrease of farmers' satisfaction on agricultural extension of the longan collaborative farming project in Lamphun province. Each piece of land needs sustenance, implying more investment cost is required and more product cost for consumers is added. The results of the study contradict the findings of Lerdyoosuk et al., 2018 found that the harvest fresh of cane by labor is preferred by sugarcane farmers in environmentally friendly harvesting practices of sugarcane at Phetchabun province. Obviously, this factor depends on the type of plant.

In terms of social status, holding a position in a longan collaborative farm tends to increase satisfaction on agricultural extension of the longan collaborative farming project. It is because a farmer is able to play a remarkable role in group management and becomes a coordinator and leader in carrying out various activities in the group. This conforms with the study of Techakhod et al. (2019). They found that the leaders in community enterprises do actively participate in their own organizational structures, leading the organization, group management, and developing the learning process of the members to sustaining the development of community enterprises. All these activities boost the increased trend of satisfaction with the extension of longan collaborative farming as the consequent result of gaining more knowledges and various kinds of information. Furthermore, the good relationship among groups of farmers and other occupation networks can be tighten. This reason is similar to that study of Sanprasert et al. (2012) who reported that the perception of having membership and participation in the management of some rubber grower group related to the satisfaction of the



rubber farmer group membership in Sanam Chai Khet district, Chachoengsao province.

6. Conclusion

From this study, we conclude that the farmer members of longan collaborative farms in Lamphun province were moderately satisfied on agricultural extension of the longan collaborative farming project. The following positive factors can significantly influence the increase satisfaction level according to the statistical analysis of collected data: (1) age, (2) having in-season and off-season of longan production plan, (3) having a variety of sources of longan distribution, (4) holding a position in longan collaborative farms, and (5) having various agricultural organization memberships. On the other hand, having too many employees and possessing too many pieces of land for longan production can significantly decrease the satisfaction level with agricultural extension of the longan collaborative farming project in Lamphun province.

7. Recommendations

Based on the discovered fact from the study, the following recommendations are provided.

1) Relevant agencies should promote and support farmers to produce good quality longan both in-season and off-season and to supply various kinds of longan product to distribution sources with fair prices.

2) Those longan growers involved or interested in upgrading the quality of their products should study and pay serious attention to the recommending opinions from the official representatives in agricultural extension of the longan collaborative farming project.

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Spatial analysis of Dengue infection using Geographic Information systems in Dili, Timor Leste

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Abstract

Dengue is an acute arthropod virus infection transmitted mainly by the *Aedes aegypti* mosquito. It is the most common arbovirus disease globally and mainly occurs in the tropics and subtropical regions of the world, with an estimated burden of 390 million cases annually. Dili municipality is the capital of Timor Leste; it is an endemic area for the dengue infection outbreak.

The aim of this study is to develop appropriate models for the identification of areas with the dengue risk factors assessed in Dili municipality by applying the Geographic Information System (GIS) as a tool for a spatial data collection system with integrated attribute data or non-spatial data to study factors influencing this municipality (Capital).

There were two categories of data collected: primary data container surveys (e.g., house index (HI), container index (CI), and Breteau index (BI)); and secondary data; number of dengue cases from January 2016 to August 2022, household number, residential areas, natural water resources, drainage areas) to analyze the relationship with dengue infection patients. Using the Pearson correlations statistic, eight main factors were found to be associated with the incidence of dengue infection, including four primary data; container index (CI), house index (HI), and Breteau index (BI)) and four secondary data (e.g., household number, residential areas, natural water resources, and drainage areas).

According to the created GIS model of dengue infection risk assessment, it was discovered that 9 % of the total areas were the very high-risk areas, 17.75% were the high-risk areas, 8.90% were the moderate-risk areas, and 64.35% were the low-risk areas. At an administrative post (sub-district) level, including Dom Aleixo, Cristo Rei, Vera Cruz, Nain Feto, Metinaro, and Atauro, it was found that Dom Aleixo was only a very high-risk area covering 33.12 km². The factors influencing the household number were shown.

After applying the GIS to dengue infection risk assessment, it was demonstrated that the GIS was an effective tool for dengue infection surveillance.

Keywords: Dengue, Geographic information systems, Timor Leste

1. Introduction

Dengue is an acute arthropod virus infection transmitted mainly by the *Aedes*



aegypti mosquito and is the most common arbovirus disease globally [1]. According to the World Health Organization (WHO), dengue fever mainly occurs in the tropics and subtropical regions of the world, with an estimated burden of 390 million cases annually, and approximately 2.5 billion people worldwide are at risk of contracting dengue fever by living in endemic areas[2]. The number of cases reported in 2010 was 2.2 million, then increased in 2016, as indicated by a large worldwide outbreak with an increase of more than 3.34 million [3]. From 2010 to 2019, more than 16 million cases were reported across the Americas, and about 10 million cases, or approximately 62% of the Pan American Health Organization (PAHO), were reported only in Brazil [1]. Additionally, 1.3 billion people live in dengue-endemic areas in 10 countries of the WHO Southeast Asia Region (SEA). All member states in the region, except for the Democratic People's Republic of Korea, are dengue-endemic. This region accounts for more than half of the global burden of the disease. Five countries (India, Indonesia, Myanmar, Sri Lanka, and Thailand) are among the 30 most endemic countries in the world [3]. Indonesia annually reports an estimated 600,000 cases of dengue fever, of which about 180,000 lead to hospitalization [4]. In India, the annual incidence of dengue fever is estimated to be around 7.5-32.5 million and is one of the leading causes of hospitalization and death [5]. There are several hypotheses regarding the causes of this problem, such as climate change, expansion of the reach of its main vector (*Aedes aegypti* mosquito), inefficient vector control, human population growth, rapid and unplanned urbanization, movement of people for trade, tourism, or forced by natural disasters, and vulnerability in public health and in vector control programs [3][6].

Timor Leste is one of the countries in the Southeast Asia Region (SEA). After separating from Indonesia in 1999, the first severe dengue outbreak was reported from January to May 2005, with a total of 1,067 reported cases and 39 deaths with a case fatality rate (CFR) of 3.6%. In response to the outbreak in 2005, the WHO Global Outbreak Alert and Response Network sent a field mission to Dili municipality, the capital city of the country. Serum samples were collected for laboratory diagnosis and results showed that dengue outbreaks were mainly caused by DENV-3, with DENV-1 and DENV-2 as minor serotypes, and that strains of these 3 DENV serotypes entered Timor Leste from neighboring countries, circulated, and caused a dengue outbreak at that time [7]. And then in the last two and a half years, according to the Department of Communicable disease control (CDC), Ministry of Health (MoH) of Timor Leste, there were 1,451 reported cases of dengue infections and 10 deaths with a case fatality rate (CFR) of 0.7% in 2020; 901 cases and 11 deaths (CFR 1.2%) in 2021; and 4,985 cases and 56 deaths (CFR 1.1%) from January to May 2022[8]. As the number of patients and mortality rates continue to increase every year, dengue remains a major public health problem in Timor Leste and needs to be controlled and prevented urgently.

Dengue prevention and control in Timor Leste is implemented using the guidelines outlined in the Biregional dengue strategy [2]. This involves a multi-pronged approach based on case management through early detection and diagnosis; vector control via spraying; source reduction activities in the community, including distributing larvicides, fumigating malathion (mosquito adulticide) in residential quarters, and mobilizing communities and volunteers to



clean up water containers; and environmental education on prevention and surveillance [8]. Dengue is mostly diagnosed based on clinical findings. Whilst current guidelines recommend the use of rapid diagnostic tests (RDTs), they are not widely used. Dengue cases are subject to obligatory notification, and cases reported are collated by the department of epidemiological surveillance at the Ministry of Health.

The majority of the cases lived in the most populated municipality of Timor Leste, Dili, the Capital [7],[9]. It was the municipality that reported the highest number of dengue infections among the other 12 municipalities since the start of the outbreak, which was reported from January to May 2005, with 55.7% of the total number of cases [7]. According to the department of communicable disease control of MoH, TL, in the last two and a half years, in 2020, with 56% of the total number of cases reported, 7 of them died (CFR 0.008%). In 2021, 75% of the total number of cases were reported; 8 of them died (CFR 0.01%); and from January to May 2022, 69% of the total number of cases were reported; 33 of them died (CFR 1.0%) [9]. The Case fatality rate has increased annually in the capital city of Timor Leste and coincides with the limited health care capacity in the country, poor access to health care, and COVID-19 [8]. Dengue infection in the capital city remains high and is considered one of the most serious public health problems.

According to the preview studies, the geographical, environmental, and sociodemographic conditions of the city [2], [9], are key factors in the occurrence of dengue infection, which is a disease caused by a virus transmitted by *Aedes* mosquitoes, especially *Ae. aegypti*. Thus, the population and source of the *Aedes* mosquito are closely related to this disease. And to date, there is no specific antiviral treatment for the dengue virus. Although the vaccine has recently been introduced, due to differences in efficacy and safety concerns in seronegative individuals, its use is limited. People who have serological evidence of the previous infection and for the age group with the highest risk of severe disease, usually older than 9 years and less than 45 years [10]. Therefore, dengue prevention and control are still considered very important, especially in vector control measures, including the vitally important study of the risk factors influencing dengue infection and making a strategy for effectively controlling dengue infection in the capital city of Timor Leste.

In the preview's literature review, only one paper related to Geographic Information System (GIS) involved dengue prevalence in Timor Leste, which contained dengue incidence was highly seasonal and spatially clustered, with positive associations with temperature, precipitation, and demographic factors [11], but did not focus at a municipal administrative level to identify risk factors based on the grade of severity of risk factors assessed. Therefore, the aim of this study is to develop appropriate models for the identification of areas with the dengue risk factors assessed in Dili municipality by applying the Geographic Information System (GIS) as a tool for a spatial data collection system with integrated attribute data or non-spatial data [12].

The data is stored in a database and can be modified and analyzed by overanalyzes, which is a technique for loading information. Aside from that, GIS is an effective tool for presenting disease incidence, disease factor analysis, and designating risk areas for dengue infection control and prevention [4] [13],



especially in the Dili municipality. In addition, correlated with the result of this study, the researcher is expected to assist the government communicable disease control (CDC) department in formulating policies, strategies, and dengue surveillance plans and can contribute to efficient epidemic control and prevention in an area.

2. Materials and Methods

Reviewing research, concepts, and theories relevant to factors in dengue infection's causation in order to employ concepts, theories, and analysis types which are the most suitable for this research about the related factors in the disease's causation. We will use the primary and secondary data in this study and will divide them into two groups of variables; dependent variables and independent variables, by applying a mathematics model such as the Pearson correlation statistic to analyze the significance correlations between dependent and independent variables and, in addition, by applying the GIS model to show the area with risk factors assessed on the map as follows:

2.1 Primary data including:

a. The containers survey (**HI**, **CI**, and **BI**)

To quantify the relative density of mosquitoes' larvae, house index (**HI**), container index (**CI**), and Breteau index (**BI**), indicators of the association between house and container considered to be the most informative measures of this density, were used and this data collection conduct during rainy season in Timor Leste[11]. For **CI**, all artificial indoor and outdoor containers [14], [15],[16]. In every house were inspected to determine the presence or absence of mosquito larvae.

The positions of the houses in the six administrative posts (*sub-district*) were selected randomly in each village (*suco*) at higher risk for mosquito breeding sites, such as those nearest the drainage areas with stagnant water, streams, and lakes, which were mapped using a USGS Earth Explorer tool. Also, data, including administrative post names and breeding sites, was imported into a GIS software for further construction (*ArcView 10.8*).

The container index data is positive for larvae. Obtained through containers surveyed in 379 households out of 39,310 the total households in Dili municipality[17, p. 26], there is a container of water made of artificial ingredients and able to collect water indoors or outdoors. The number of inspected containers, the type of containers, and the number of containers with at least one mosquito larva were recorded. Using the World Health Organization list of recognized containers (WHO, 2003)[14], each inspected container was classified as either a recognized container or an unrecognized container.

In this variable, we follow the process to collect the population and sample (Household) to distribute the check list by applying the formula of (Krejcie & Morgan) with a 5% margin of error and a 95% confidence level[18].

Breteau Index (**BI**), House Index (**HI**) and Container Index (**CI**) for each type of container were computed using the following formulas:



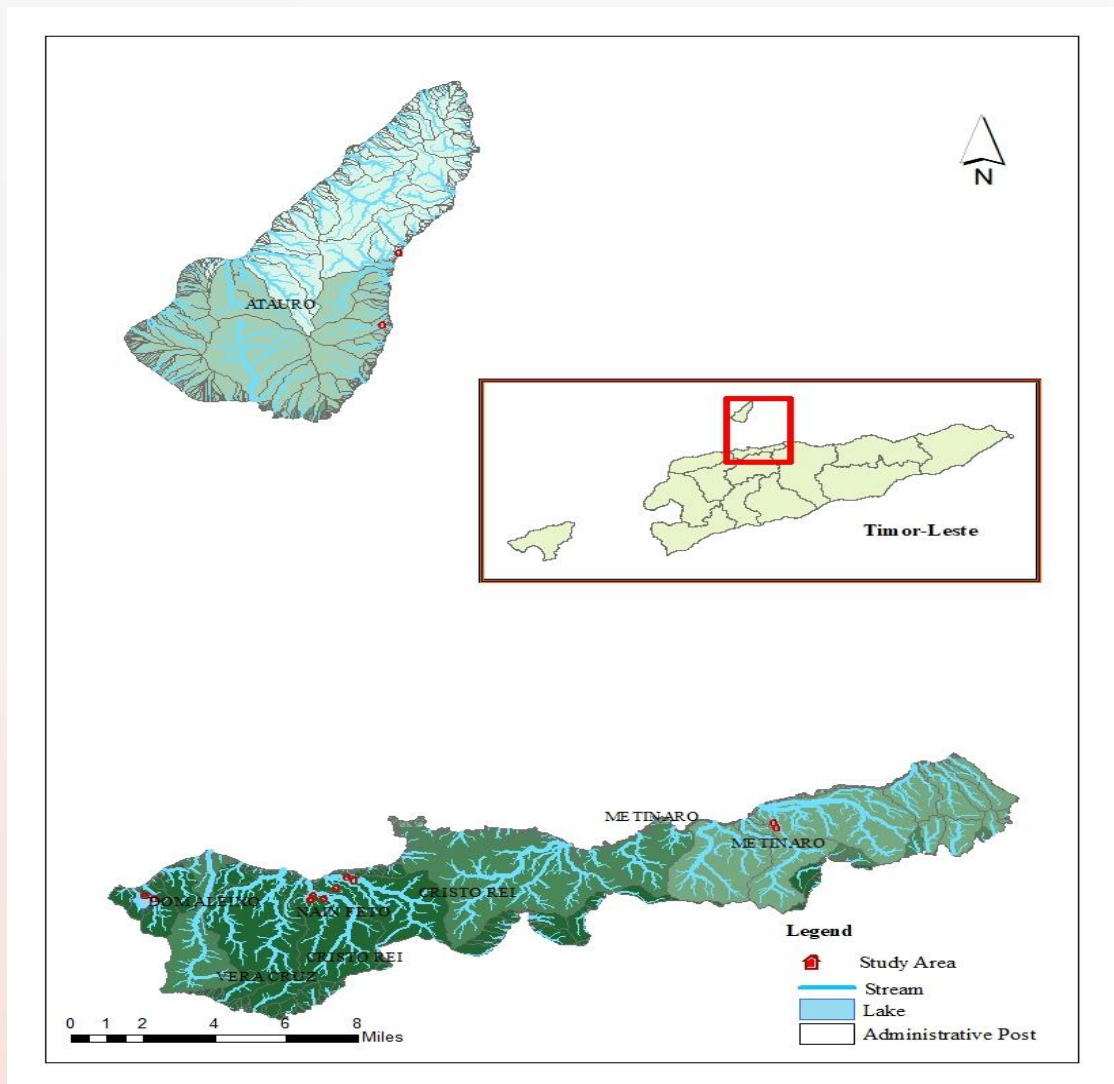
$$CI = \frac{\text{Number of positive artificial containers}}{\text{Total number of Container inspected}} \times 100$$

$$HI = \frac{\text{Number of Houses positive for musquito larvae}}{\text{Total number of inspected households}} \times 100$$

$$BI = \frac{\text{Number of positive artificial containers}}{\text{Total number of inspected households}} \times 100$$

Study site for container surveyed

Figure 1. Risk area in six administrative post of Dili municipality selected for the study.





2.2 Secondary data

Administrative boundaries of administrative posts (subdistricts) and villages (sucos) in Dili municipality have changed over time, and there were six administrative posts and 32 villages (sucos) in each of the six administrative posts in the map downloaded from the web site of the Geographic Information Group (GIG) in Timor Leste (<https://sites.google.com/site/gigtimorleste/data/administrative-boundaries>). While new administrative boundary data was being updated, Dili municipality was divided into five administrative posts (subdistricts) and 36 villages (sucos) [19][20], with dengue data and other secondary data collected from six administrative posts and 32 villages (sucos). In this analysis, six spatial units were used after reconciling the dengue data to match the boundary map and the data for analysis as follows:

The Health Statistic Information (EIS) department, Ministry of Health Timor Leste (MoH.TL), provided data on the number of dengue infection patients in each administrative post (subdistrict) of Dili municipality from January 2016 to August, 2022.

The data on total population, the number of households in each administrative post (subdistrict), and surface in each administrative post (subdistrict) of Dili municipality come from the Dili municipality statistical office and the Population and Housing Census 2015, [21][17].

Under the Ministry of Public Works, the Department of Roads, Bridges, and Flood Control. The data includes: drainage areas.

The spatial data on land use in Dili Municipality comes from the application Google Earth Pro, Free Download (<https://earth.google.com/web/search/>). The data includes: Natural water resources and Residential areas.

2.3 Determining related factors in the Dengue infections

Causation

Determining factors for the Dengue infection risk assessment in the areas of Dili municipality. The factors are as follows:

- ☑ Independent variables;
 1. Container index (CI)
 2. House Index (HI)
 3. Breteau Index (BI)
 4. The data of the household number
 5. The data of residential areas (km²)
 6. The data of drainages areas with water stagnant (m²)
 7. The data of natural water resources(km²)
- ☑ Dependent variable; The number of dengue cases (2016-2022)

According to several preliminary studies, these factors were also linked to an increase in dengue outbreaks and vulnerability in each area. [12], [14]–[16], [22].

2.4 Analysis data



2.4.1 The creation of a GIS model of dengue infection and risk assessment in Dili municipality.

a) Analyzing all of the previously mentioned dengue infection risk factors in the Dili municipal areas (six administrative posts). This research adopted Pearson’s correlation Statistic to measure the relationship between 8 independent variables and their dependent variables, which was the number of dengue infection patients in Dili municipality from 2016 to August 2022 with the SPSS program. Afterwards, assessing the risk of the disease with the analyzed factors at a statistical significance of less than 5% (p -value < 0.05).

$$r = \frac{\sum(xi - \bar{x})(yi - \bar{y})}{\sqrt{\sum(xi - \bar{x})^2 \sum(yi - \bar{y})^2}}$$

Where:

r = Pearson correlation coefficient

xi = x Variable samples

yi = y variable samples

\bar{x} = mean of values in x variable

\bar{y} = mean of values in y variable

b) Building the Geographic Information System models of the Dengue infection and disease risk assessment after analyzing the related factors in the dengue infection causation with the QGIS system. Each factor was scored adopting a preview study in Samut Songkhram province, Thailand [12] on a scale ranging from 1-3. Using the Overlay Analysis of GIS to analyze the obtained scores and assess risks of the Dengue infection in each post administrative (subdistrict) of Dili municipality. Dividing risk degrees into four colors including, dark red, red, yellow, and green and setting the score level of the very high risk at ≥ 94 , the level of the high risk at 76 – 93, the level of the moderate risk at 58 – 75, and the level of the low risk at ≤ 57 respectively. To create a frequency distribution, the interval width equaled to range divided by the number of intervals. Afterwards, analyzing the Dengue infection risks at four administrative levels: Municipality, Administrative Post (Subdistrict), and village (Suco).

2.4.2 The study factors influencing of Dili municipality

Stepwise multiple regression was selected as the method for studying the dengue infection factors influencing the increase of dengue cases. First of all, we determined whether there was multicollinearity among the 8 gathered factors of independent variables. After that, we employed stepwise multiple regressions to analyze the independent factors at a p -value of < 0.05.

To find out how much influence the existing independent variables have on the dependent variable (Dengue) partially or simultaneously and what percentage of the influence of these independent variables we will conduct several hypothesis tests, namely the t test, the F test and how much is the value of R square.



simultaneous in this study, we use several formulas in the SPSS program that have been used in a previous study[12].

3. Result

3.1 Related Factors in the Dengue Infection Causation for the Created GIS Model

3.1.1 Primary data

Containers surveyed with positive mosquito larvae

Among 378 houses, 195 (51.5%) artificial containers harbored mosquito larvae. Among 1,698 water containers, 752 (44.29%) have larvae of mosquitos. In Dili municipality, most of the population uses wells as water sources. Based on the results of the survey in six administrative posts (sub-districts), buckets are the most commonly used container, but the most positive container was concrete water storage tanks for bathrooms (**Table 4**).

Dom Aleixo's administrative posts have two types of water sources: wells and lakes. Most of the types of containers commonly found are buckets, but most of the larvae-positive containers found were concrete water storage tanks for bathrooms. Most of the population in the Cristo Rei administrative post used wells and tap water as a source of water. Buckets are the most commonly used containers, followed by concrete water storage tanks for bathrooms (**Table1**). Concrete water storage tanks for bathrooms are the most larvae-infested containers. Most of the population in the Vera Cruz administrative post used wells and tap water as a source of water (**Table.2**). Buckets are the most commonly used containers, followed by concrete water storage tanks for bathrooms. Concrete water storage tanks for bathrooms are the most larvae-infested containers. Most of the population in Nain Feto used wells and tap water as a source of water (**Table.2**). Buckets are the most commonly used containers, followed by concrete water storage tanks for bathrooms. Concrete water storage tanks for bathrooms are the most larvae-infested containers.

Most of the population in the Metinaro Administrative Post used wells and tap water as a source of water (**Table.3**). Buckets are the most commonly used containers, followed by concrete water storage tanks for bathrooms. While the types of containers that have the most larvae are concrete water storage tanks for bathrooms, most of the population in the Atauro Administrative Post uses wells and tap water as a source of water. Buckets are the most commonly used containers, followed by concrete water storage tanks for bathrooms. Concrete water storage tanks for bathrooms are the most larvae-infested containers.

400 water containers were discovered in Dom Aleixo, 246 in Cristo Rei, 281 in Vera Cruz, 287 in Nain Feto, 265 in Metinaro, and 219 in Atauro's administrative post, out of the 1,698 examined



Table 1. Mosquito larvae survey in Dom Aleixo and Cristo Rei administrative posts

Mosquito larvae survey in the container in Dom Aleixo's administrative post (sub-district)						
No.	Type of container	Number of Container inspected	Number of Positive Container	Household Inspected	Household Positive based on Container Type	Number of Household Positive
Recognized containers						
1	Concrete water storage tanks for bathrooms	63	59	63	21	41
2	Discarded tires	50	49		5	
3	Discarded bottles and tin cans	42	31		4	
4	Metal drums for water storage	36	28		3	
5	Buckets	82	27		3	
6	Plastic containers	29	22		3	
7	Water trays of refrigerators	20	12		2	
8	Pots	28	21		3	
9	Animal water container	44	40		3	
Unrecognized containers						
1	Water trays of dispenser	3	0		0	
2	Aquarium	2	0		0	
3	Pan	1	0		0	
Total		400	289			

Mosquito Larvae survey in the container in Cristo Rei administrative post (sub-district)						
No.	Type of container	Number of Container inspected	Number of Positive Container	Household Inspected	Household Positive based on Container Type	Number of Household Positive
Recognized containers						
1	Concrete water storage tanks for bathrooms	65	41	63	31	35
2	Discarded tires	49	31		5	
3	Discarded bottles and tin cans	38	20		3	
4	Metal drums for water storage	30	18		3	
5	Buckets	30	16		3	
6	Plastic containers	29	12		3	
7	Water trays of refrigerators	4	0		2	
8	Pots	29	9		3	
9	Animal water container	4	0		3	
Unrecognized containers						
1	Water trays of dispenser	0	0		0	
2	Aquarium	0	0		0	
3	Pan	1	0		0	
Total		246	147			





Table 2. Mosquito larvae survey in Vera Cruz and Nain Feto administrative posts

Mosquito larvae survey in the container in Vera Cruz administrative post (sub-district)					
Type of container	Number of Container inspected	Number of Positive Container	Household Inspected	Household Positive based on Container Type	Number of Positive
Unlabeled containers					
Water tanks for bathrooms	53	41	63	34	
Water tanks	34	31		5	
Plastic tin cans	34	21		5	
Plastic storage	26	0		3	
Plastic bottles	82	30		3	
Plastic jugs	29	16		3	
Plastic containers	0	0		2	
Plastic buckets	15	2		3	
Plastic tubs	7	2		3	
Labelled containers					
Water filter	0	0		0	
Water dispenser	0	0		0	
Water cooler	1	0		0	
Total	281	143			
Mosquito larvae survey in the container in Nain Feto administrative post (sub-district)					
Type of container	Number of Container inspected	Number of Positive Container	Household Inspected	Household Positive based on Container Type	Number of Positive
Unlabeled containers					
Water tanks for bathrooms	73	32	63	33	
Water tanks	24	21		5	
Plastic tin cans	35	25		5	
Plastic storage	25	0		3	
Plastic bottles	60	3		3	
Plastic jugs	10	0		3	
Plastic containers	3	1		2	
Plastic buckets	35	2		3	
Plastic tubs	8	0		3	
Labelled containers					
Water filter	17	0		0	
Water dispenser	0	0		0	
Water cooler	7	0		0	
Total	287	84			

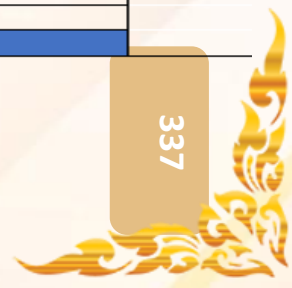




Table 3. Mosquito larvae survey in Metinaro and Atauro administrative posts

Mosquito larvae survey in the container in Metinaro administrative post (sub-district)					
Type of container	Number of Container inspected	Number of Positive Container	Household Inspected	Household Positive based on Container Type	Number of Positive Household
Uninspected containers					
Water tanks for bathrooms	65	17	63	28	
Water tanks	5	1		5	
Old tin cans	37	2		5	
Water storage	36	0		3	
Water storage	82	14		3	
Water storage	18	8		3	
Water storage	2	0		2	
Water storage	10	1		3	
Water storage	9	3		3	
Inspected containers					
Water storage	0	0		0	
Water storage	0	0		0	
Water storage	1	0		0	
Total	265	46			

Mosquito larvae survey in the container in Atauro administrative post (sub-district)					
Type of container	Number of Container inspected	Number of Positive Container	Household Inspected	Household Positive based on Container Type	Number of Positive Household
Uninspected containers					
Water tanks for bathrooms	66	26	63	23	
Water tanks	5	0		5	
Old tin cans	20	5		5	
Water storage	30	0		3	
Water storage	65	7		3	
Water storage	15	4		3	
Water storage	1	0		2	
Water storage	9	1		3	
Water storage	3	0		3	
Inspected containers					
Water storage	5	0		0	
Water storage	0	0		0	
Water storage	0	0		0	
Total	219	43			





With 195 out of 378 households having containers positive for mosquito larvae, and Dom Aleixo's administrative post has the highest Container Index (CI) of 17.02%, with nine types of recognized containers and three types of artificial, unrecognized containers examined. Almost all types of containers inspected have at least one container positive for mosquito larvae. On the other side, Cristo Rei administrative post has a CI of 8.66 %, Vera Cruz has a CI of 8.42 % with. Nain Feto has a CI of 29.2 %, Metinaro has a CI of 17.3 % the highest House Index owned by Dom Aleixo administrative post HI= 41 (10.8%), followed by Cristo Rei HI=35 (9.3%) and Vera Cruz HI= 35 (9.3 %).

Dom Aleixo was an administrative post (Sub-district) with the highest Breteau Index (BI=76.46 %) followed by Cristo rei (BI=38.89 %) and Vera Cruz (BI=37.83 %) (Table 4).

Table 4
Total number of houses surveyed and houses found with mosquito larvae

Administrative Post (Sub-districts) <i>n</i> = 6	Houses surveyed	House found with mosquito larvae index (HI %)	Water containers surveyed	Container Index (CI)	Breteau Index (BI)
Dom Aleixo	63	41 (10.8 %)	400	289 (17.02%)	76.46
Cristo Rei	63	35 (9.3%)	246	147 (8.66%)	38.89
Vera Cruz	63	35 (9.3%)	281	143 (8.42%)	37.83
Nain Feto	63	33 (8.7%)	287	84 (4.95%)	22.22
Metinaro	63	28 (7.4%)	265	46 (2.71%)	12.17
Atauro	63	23 (6.0%)	219	43 (2.53%)	11.38
Total	378	195 (51.5 %)	1698	752 (44.29%)	

3.1.1 Secondary data

Besides the primary data, secondary data were obtained from relevant organizations as part of the Dili municipality dengue study, and it was considered that those were the risk factors that contributed to increased dengue incidence in an area, in part as described elsewhere[12], [23], [24].

The 5 variables of secondary data obtained from relevant organizations in Dili municipality (**Table 5**) were dengue cases from 2016 to 2022, and 3,522 (52.1%) of the total 6,761 dengue cases were reported in Dom Aleixo Administrative Post, and five other administrative posts reported less than half of the total 6,761 dengue cases reported. a while according to the incidence rate per 1000 population there was Metinaro administrative post was most reported with 33 cases per 1000 population compare with five other administrative post.

Regarding the area of housing, the largest residential area was in Dom Aleixo administrative post, with 24.51 km² (43.2%) of the total 56.8 km² residential area, and the next largest was in Cristo Rei administrative post, with 17.85 km² (31.4%) of the total 56.8 km² residential area.

The household number most obtained was in Dom Aleixo Administrative Post, with 13,164 (41.7 %) of the total 31,575 households, followed by Cristo Rei Administrative Post with 7,734 (24.5%) of the total households in Dili



municipality, and less than one-tenth of the households in four other administrative posts.

The natural water resources in this study include rivers, streams that do not have seasons, and lakes that exist in each of the six administrative posts; thus, the Dom Aleixo administrative post had the largest reported area with 3.7 km² (45.6%) of the total 8.2 km², followed by the Cristo Rei administrative post with 3.1 km² (38%), the Vera Cruz administrative post with 1.1 km² (13.6%), and the Nain Feto, Metinaro, and Atauro administrative posts with 0.1 km² (1.2%).

Ditches on national roads, cross-administrative post roads (inter-sub-districts), and community roads in residential areas with unconditional convenience, such as the risk of puddles and puddles of water due to waste, and other areas still in the construction phase or lifted by the construction company at many times, are included in this study's drainage areas. As a result of the data obtained, Dom Aleixo Administrative Post had the largest drainage area with 1,450,000 m² (48.5%) of the total 2,990,000 m² followed by Cristo Rei Administrative Post with 1,120,000 m² (37.5%) of the total 2,990,000 m².

Based on all the secondary data obtained, it shows that the area with the most significant risk factor assessed in Dili municipality is the Dom Aleixo Administrative Post (subdistrict), where seven villages (Bairro Pite, Bebonuk, Comoro, Fatuhada, Madohi, Manleuana and Kampung Alor) are located, and the Cristo Rei Administrative Post, where eight villages (Ailok, Balibar, Becora, Bidau Santana, Camea, Culu Hun, Hera, and Meti Aut) are located, followed by four other administrative posts (sub-districts) such as Vera Cruz with seven villages (Caicoli, Colmera, Dare, Lahane Ocidental, Mascarenhas, Motael, and Vila Verde), Nain Feto with six villages (Acadiru Hun, Bemori, Bidau Lecidere, Gricenfor, Lahane Oriental, and Santa Cruz), and Atauro with five villages (Beloi, Biqueli, Macadade, Maquili, and Vila Maumeta) and In Metinaro's administrative post, there were three villages (Benunuc/Duyung, Mantelolao, and Sabuli)[19].



Table 5. The secondary data on dengue and risk factors assessed in Dili municipality at each administrative post (sub-district)

Administrative Post	Dengue Cases 2016-2022	(%)	Dengue Case /1000 Pop.	(%)	Household	(%)	Residential Area /km ²	(%)	Natural Water resources (km ²)	(%)	Drainage
Dili	3,522	52.1	30.8	21	17,499	41.7	17.5	36.2	3.7	45.1	1,450
Alfai	1,264	18.7	21.5	14	8,149	24.5	15.1	31.3	3.1	37.8	1,210
Uz	874	12.9	28.2	19	4,797	15.7	6.5	13.5	1.1	13.4	411
to	819	12.1	24.1	16	6,255	10.3	2.6	5.4	0.1	1.2	110
ro	187	2.8	34.1	23	864	2.4	4.4	9.1	0.1	1.2	100
o	95	1.4	10.2	7	1,746	5.4	2.2	4.6	0.1	1.2	90
Total	6,761	100	148.9	100	39,310	100	48.3	100	8.2	100.0	3,280

Sources: The Ministry of Health Timor Leste (MoH.TL)'s Health Statistic Information (HSI) department, the Ministry of Public Works, the Department of Roads, Bridges, and Flood Control, and the application Google Earth Pro (free download at <https://earth.google.com/web/search/>), as well as the results of the 2015 Population and Housing Census. [25]





3.1 Geographic Information System (GIS) Model of Dengue Infection and Risk Factors Assessment in Dili Municipality.

3.3.1 Dengue infection risk assessment at a Municipality level

According to the Geographic Information System (GIS) model of dengue infection created with ArcGIS and Overlay Analysis based on related factors such as the number of dengue infection patients per thousand inhabitant of each of the six administrative posts (subdistricts), including the entomological survey such as Container Index (CI), House index (HI), Breteau index (BI), the household number, the largeness of the residential area, natural water resources, and drainage areas, the risk factor assessment in Dili municipality, with a total area of 368.12 square kilometers (km²), was divided into four degrees: very high-risk areas; high-risk areas; moderate-risk areas; low-risk areas, It was found that the very high-risk areas covered 33.12 square kilometers (km²), equivalent to 9% of the total areas, and the high-risk areas covered 65.33 square kilometers (km²) or 17.75 % of the total areas. The moderate-risk areas covered 32.77 square kilometers (km²) or 8.90 % of the total area, and the low-risk areas covered 1036.89 square kilometers (km²) or 64.35 % of the total areas.

3.3.2 Dengue infection risk assessment at an administrative post (subdistrict) level.

According to the results of Dengue infection risk assessment at four degrees in 6 Administrative posts (subdistricts) as shown in the **Table 8**, it was found that Dom Aleixo Administrative Post, Dili municipality was the very high-risk area. The high-risk area included Cristo Rei Administrative post (subdistrict). The moderate risk area was Vera Cruz (subdistrict). The low-risk areas included 3 Administrative Post (subdistricts), namely: Atauro, Metinaro and Nain Feto Administrative Posts (subdistricts).

3.3.3 Dengue infection risk assessment at a village (Suco) level

The results of the dengue infection risk assessment at four degrees in 32 villages of Dili Municipality showed that seven villages were at very high risk, where residents reside in Dom Aleixo Administrative Post (Bairro Pite, Bebonuk, Comoro, Fatuhada, Kampung Alor, Madohi and Manleuana); eight villages were at high risk, where residents reside in Cristo Rei Administrative Post (Ailok, Balibar, Becora, Bidau Santana, Camea, Culu Hun, Hera, and Meti Aut) ; seven villages were at moderate risk, where residents reside in Vera Cruz Administrative Post (Caicoli, Colmera, Dare, Lahane Ocidental, Mascarenhas, Motael, and Vila Verde) ; and 14 other villages were at low risk, where residents reside in Nain Feto (Acadiru Hun, Bemori, Bidau Lecidere, Gricenfor, Lahane Oriental, and Santa Cruz), Metinaro (Benunuc/Duyung, Mantelolao, Sabuli), and Atauro administrative posts (Beloi, Biqueli, Macadade, Maquili and Vila Maumeta)[19]

3.3.4 Factors influencing of Dili Municipality

According to an interpreted result of 8 independent variables of primary and secondary data from the multiple regression analysis, the major factor influencing the dengue infection patient number in the Dili municipality was secondary data obtained, such as household number, as shown in Table 7. According to the



multiple regression analysis, the variation between the household number and the Dengue patient number was 97.7 % ($R^2 = 0.977$), and the coefficient B was 98.8 % (0.988). It demonstrated that, when all other factors were held constant, an increase in household size caused a 98.8 % increase in dengue infection patient numbers. When taking coefficient B (now beta) into account, household numbers influenced the increase in the number of dengue patients (Beta = 0.988).

Furthermore, only the total household number of each of the six administrative posts (subdistricts) had a statistically significant result in multiple regression analysis, primarily with a p -value of 0.000 or with significance less than 0.05 p -value with a t test of 12.899 or more than t table 2.78 [26] and according to the F -test of 166.373 or more than F -table 6.61 [27], and showing a statistical significance of p -value 0.000 less than 0.05. Therefore, the hypothesis of this study According to an interpreted result of eight independent variables from the multiple regression analysis, the major factor influencing the Dengue patient number was household number, which could explain the variation in Dengue patient numbers.

Table 6
Dengue influencing according to the secondary data

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.988 ^a	.977	.971	214.820

a. Predictors: (Constant), Household

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7677700.423	1	7677700.423	166.373	.000 ^b
	Residual	184590.411	4	46147.603		
	Total	7862290.833	5			

a. Dependent Variable: Dengue

b. Predictors: (Constant), Household

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
		B	Std. Error			
1	(Constant)	-	136.509		-	.17
		222.503			1.630	.8
	Household	.206	.016	.988	12.899	.000



a. Dependent Variable: Dengue

4. Discussion

This is the first study to explore the spatial analysis of the dengue risk factor in Dili, Timor-Leste. There was evidence of spatial clustering of dengue risk after accounting for the covariates, suggesting that variability in geographical and environmental conditions and control explain much of the spatial dynamics of the disease. This is similar to findings from studies in other parts of the world [12], [22], [28].

The current policy of dengue eradication in Timor Leste, under the ministry of health, is implemented using the guidelines outlined in the Biregional Dengue Strategy [2], [11], this involves a multi-pronged approach based on case management through early detection and diagnosis; vector control via spraying; source reduction activities in the community, including distributing larvicides, fumigating with malathion (a mosquito adulticide) in residential quarters, and mobilizing communities and volunteers to clean up water containers; and environmental education on prevention and surveillance [8]. The Ministry of Health of Timor Leste is leading the outbreak response activities in the field; the Community Health Center is handling the treatment of dengue patients and referral services; and other non-governmental organizations are also reported in the field, such as the World Health Organization (WHO), Red Cross Red Crescent Movement partners, and academia, which provide support and assistance by deploying volunteers and actively participating in the operation [9], [29]. Even though many efforts have been made to establish dengue control in Timor Leste, in fact, dengue remains a concern for the health sector, and this is in accordance with Indonesia's status as a dengue endemic country that has made many efforts to establish it, but in fact, dengue remains a concerning public health problem [30].

Dili municipality, as well as the country's capital, is considered an endemic area, with the most reported dengue cases annually among twelve other municipalities [7] [8]. As a result, in this study, we assessed the spatial analysis of dengue risk factors in Dili municipality using the Geographic Information Systems (GIS) model, Pearson's correlation coefficient, and the multiple regression analysis method to measure the statistical relationship of the dengue in Dili municipality, after analyzing all related factors and in accordance with the preview's study [14]–[16], [22], It was discovered that a total of seven factors related to dengue incidence in Dili municipality, such as the containers surveyed; including the container index (CI), house index (HI), and Breteau index (BI), as well as indicators of mosquito larvae density and breeding sites; Household numbers; residential areas; drainage areas with stagnant water; and natural water resources.

Based on our survey, most of the types of containers in six administrative posts (subdistricts) are similar. Discarded tires, discarded bottles and tin cans, metal drums for water storage, concrete water storage tanks for bathrooms, buckets, plastic containers, and several other containers are found in almost every administrative post (subdistrict). The main finding was that larval indices (CI, HI, and BI) are high enough to signal a significant risk of *Aedes*-borne diseases, and



there was a correlation with the number of dengue cases reported in each administrative post (subdistrict).

This result is consistent with a study by *Prasetyowati, Ipa, and Widawati*; entomology indices (container index, house index, and Breteau index) in all areas show that all containers surveyed are those used for daily life, and the areas surveyed have a moderate transmission of dengue fever [14], and in accordance with Kahamba and Chaikoolvatana, *et al.*, on the habitat characteristics and insecticide susceptibility of *Aedes aegypti* and the utilization of a geographic information system for surveillance of *Aedes aegypti* and dengue hemorrhagic fever, the larval indices (container index, house index, and Breteau index) are high enough to signal a significant risk of *Aedes*-borne diseases in the surveyed area [15] and *Ae.aegypti* indices including container index, house index and Breteau index indicated a rise in the rainy season period compared with the dry weather period showed a similar rise and fall in the number of dengue hemorrhagic fever (DHF) cases that more reported in the rainy season [16].

Therefore, the larval indices with three indicators, such as the container index (CI), house index (HI), and breteau index (BI), are an important determinant factor to identify a dengue outbreak or the risk of dengue transmission. that contributes to increasing the dengue incidence in an area.

The household number, the largest residential area, and natural water resources, including improper drainage areas, were the important factors in the increase in *Aedes aegypti* breeding sites and numbers. The major factor of dengue infection, according to this factor influence result, is household number, which is consistent with the findings of *Chaiphongpachara et al.*, who discovered that household number, population density, and the largest residential areas were important factors in the increase in *Aedes aegypti* breeding places and numbers [12], and in accordance with *Velasco-Salas et al.*'s study of Spatial Analysis of Dengue Seroprevalence and Modeling of Transmission Risk Factors in a Dengue Hyperendemic and its Association with the House at an Average Distance of 20 to 110 Meters [31], and *Marianni et al.*'s research on the density of *Aedes aegypti* and *Aedes albopictus* and its association with the number of residents and meteorological variables in the home environment of a dengue endemic area[32], and *Din et al.*'s study show that the areas with the most dengue cases have very poor sanitary (improper drainage) living conditions[28].

Therefore, the area with the most households and the largest assessed residential area (including natural water and improper drainage) is more likely to contribute to an increased dengue outbreak.

Meanwhile, studies have found meteorological factors[11] such as area height, temperature, and rainfall, as well as demographic factors such as population density, to be relevant to dengue incidence[32][30][33]. However, the dengue incidence in Dili municipality at the administrative post and village level was not included in the data on meteorological factors and population density factors because the municipality is small and the methodological data among other municipalities and population density among the six administrative posts did not have the same big differences [17][20], Nevertheless, we considered them important risk factors that contributed to increasing dengue incidence in an area.

As for the degrees of dengue infection risk in Dili municipality, it was



discovered that the very high-risk area covered 9% of the total areas and the high-risk area covered 17.75 % of the total areas. The areas in the two risk degrees were mainly urban and high-density in household number[17], and other risk factors accessed since *Ae. Aegypti* primarily live around human habitations and these area more reported dengue cases. Therefore, the number of *Ae. Aegypti* in high household number including residential areas with high density was much higher in residential areas or household number with low density[34][12][35]. The finding was in accordance with *Marianni's* research, the DHF risk assessment result demonstrating that low risk areas were mostly suburban and less-dense residential areas [34].

At municipality and administrative post levels of dengue infection risk assessment, Dom Aleixo administrative post was at very risk and higher risk than the other five administrative post. Dom Aleixo administrative post, in fact, has a number of local strength units such as schools, church, markets, and airport and have the big natural water resource including lake stream and river[20]. This possibly caused a risk of Dengue infection development to the population.

Therefore, government agencies in Dili municipality accordingly should give a main focus to this area in order to monitor the Dengue outbreak among population including tourists from the area to other areas. For the Dengue infection risk assessment at a village level, it was found that there were only 7 villages at very high risk and 14 villages at low risk. Even though most of the villages were at low risk, Dengue control and prevention are still essential. Because Dili is a small municipality including as Capital city of Timor Leste this can facilitate population dispersal[20].

There are a number of limitations to this study. First, concerning the primary data, such as the container survey, we only conducted it in one phase over a period of time, primarily during the rainy season (November-December), and we did not bring the results to the laboratory to identify the type of mosquito larvae obtained. Secondly dengue patient data was obtained solely on the basis of administrative post (sub distinct) levels and not adjusted according to severity, age group, or gender, or the average number of dengue patients per year, which relationship measure but in this study only total of dengue patient during the last of seven years using in analysis of this study.

Furthermore, the strengths of this study were demonstrated after obtaining the results of applying the Geographic Information System (GIS) to dengue infection risk assessment. It was shown that the GIS was an effective tool[36], In assisting government agencies (the Department of Communicable Disease Control) in developing a policy, strategy, and plan for dengue infection surveillance in the Dili municipality, including other sectors, to prioritize areas of action in the study area related to the identified risk factors that contributed to an increase in the number of dengue incidences, such as geographical conditions, environmental factors, and so on (under the ministries of state administration, public works, and education).

In addition, considering this study result, the next study proposes to assess the association of dengue and climatic variation as part of climate change. It seeks analytical evidence of a relationship between population knowledge, attitude, and practice (KAP) in dengue prevention and control; human population growth (rapid and unplanned urbanization); movement of people for trade, tourism, or



forced by natural disasters; and vulnerability in public health and vector control programs and dengue cases. All residents of the villages should cooperate in controlling and preventing the dengue incidence and outbreak.

Conclusions

The dengue risk factor is very high and highly assessed in Dili, Timor-Leste, where it occupies 26% of the total area. It is mainly caused by environmental and geographical conditions, which are significant predictors of dengue cases, and the Geographic Information System (GIS) is one of the most effective tools for dengue surveillance in an area. This calls for public health actions and other sectors to mitigate future dengue risk factors from environmental and geographical conditions. In addition, the Geographic Information System (GIS) is a very useful tool for Timor Leste as a young country, as well as an innovation tool to contribute to dengue surveillance, including other infectious diseases.

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An Analysis of Speech Acts by *Joe* in *Soul* Animation Movie

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Abstract

People used utterances to express their feelings and intentions. In communication, a person has a specific purpose with what they say. A speech act is an utterance that serves a communication purpose. The listener would have different interpretations in this regard. Therefore, this study aimed to 1) investigate the types of illocutionary acts are produced by the main characters in *Soul Animation*, 2) investigate the types of perlocutionary acts produced by the interlocutors in *Soul Animation*. The population for this study comprised of *Soul Animation*, Pixar published in 2020. All the utterances are performed by *Joe's* main character which included 80 scenes. The samples were 20 scenes randomly from the entire movie using a systematic random sampling method. A movie script, coding table, and coding guideline were employed as the research instruments. The illocutionary acts and perlocutionary acts were coded by researcher after that the corpus analysis software, AntConc version 3.4.4 was applied to analyzed categorize of illocutionary acts and perlocutionary acts and its causes to find the frequencies and percentages. Moreover, The Cohen's kappa was applied in this study to find the reliability.

The finding of the study shown that there were four categories of illocutionary acts, which were representative, directive, commissive, and expressive. The representative speech were shown at the highest percentage. On the other hand, the expressive speech was shown at the lowest percentage. Throughout the analysis of the data, the declarative type was not founded by the main character in the movie. In addition, the researcher found 8 of 12 types of perlocutionary acts occurred in the movie. The most frequent category found was when the hearer is giving an answer. Followed by when the hearer thinks of something, the hearer knows something, the hearer is doing somethings, the hearer feels irritated, the hearer relieves tension, the hearer is convinced, and the hearer is inspired respectively.

Keywords: speech acts, movie, illocutionary acts, perlocutionary acts

1. Introduction

In daily life, as human beings, people always interact with each other in society. It must happen and cannot be avoided. Interaction with society is a necessity, in other words, people cannot live alone without help from others. People use language to express thought, ideas and emotions by using sounds, gestures, and signals for many different purposes and reasons. Moreover, people



have to know how to use a language appropriately in order to understand well when they are communicating with each other. So, communication is very important, anytime and anywhere.

Communication is a very important part of daily life and work. It is becoming an influential medium as they work together as an audio and visual medium. Understanding the use of language in the real environment is an essential part of language learning for many children, especially English Language Learners.

People use utterances to express their feelings and intentions, according to Stubbs (1983). They also share information and assumptions between the speaker and the listener. Schmidt and Richards (2002) defined an utterance as an entity analysis of a speech that has been distinguished in various ways, but generally as a series of words within a person's turn at talking that fall under a single intonation pattern. As a result, utterances must be understood by the listener in order to be successful in communication.

These days, language is employed in movies; it contains vibrant language that conveys numerous meanings that are not the actual meaning of the words. When we watch a movie, we can gain more than just amusement. We can also gain knowledge about the implicit educational, moral, or other values as well as the performance of the actors and actresses, which may include their social interactions and the language and vocabulary they employ. These research areas fall under the purview of interdisciplinary disciplines including pragmatics, sociolinguistics, psycholinguistics, and others. Both of those interdisciplinary fields of study can aid in our understanding of the language used in a conversation or in a movie. The social life of people is reflected in one kind of media, the movie. A movie, usually referred to as a motion picture, is a collection of images made up of a number of separate shots that are connected in a long sequence. The dialogue (talk) between the characters is one of the significant aspects that frequently occurs in movies. The dialogue between the characters often contains illocutionary acts and perlocutionary acts.

The researcher is interested in how different people make sense of their lives in this case, and the utterances that people produce can have both literal and implicit meanings. The listener will have different interpretations in this regard. Although other researchers have conducted several studies on illocutionary acts and perlocutionary acts in films, in which many things are performed, is still limited. As a result, the researcher is interested in conducting a similar study on Soul animation to determine the types of illocutionary acts and perlocutionary acts existed in the movie. This research aimed to explain the different sorts of illocutionary acts, as well as the speaker's intent and the effect of the utterance. The findings of this study would be valuable for teaching and learning pragmatics, and they might also be utilized as guidance for teachers and individuals interested in English to improve their English courses. Furthermore, they might be valuable for future pragmatics or speech act study.

The researcher interested that Joe is the first protagonist of African American who loves jazz music and try to explain to another people about what he love and what is his passion.

1.1 Research objectives



1.1.1 To investigate the types of illocutionary acts produced by the main characters in Soul Animation

1.1.2 To investigate the types of perlocutionary acts produced by the interlocutors in Soul Animation

2. Literature Review

2.1 Pragmatics

Finch (2000) offers a definition of pragmatics. He claims that pragmatics is concerned with the meaning of utterances. Furthermore, pragmatics focuses on what is not clearly expressed and how individuals understand utterances in context.

The three categories of speech actions identified by Austin (1962) are locutionary acts, illocutionary acts, and perlocutionary acts. The explanation that follows is based on the many Austin is speech acts.

2.1.1 Features of Pragmatics

This section is divided topics: utterances and situational context. Each is discussed below:

2.1.1.1 Utterances

When individuals converse, they make an utterance. An utterance is a unit of speech analysis that has been defined in a variety of ways, but most typically as a series of words inside a single person's turn at talking that falls under a single intonation counter. Schmidt and Richards (2002) say that utterances might occasionally be made up of shorter spans of speech than sentences.

2.1.1.2 Situational Context

A definition of context has been offered by another expert. Cutting (2002) defines context as the physical and social worlds, as well as the knowledge assumptions shared by the speaker and hearer. Furthermore, context may be divided into three types: situational context, background knowledge context, and co-textual context.

2.1.2 Features of Speech Situation

Leech (1996) defines pragmatic function as a way of discussion uses words. It focuses on a goal-oriented communication scenario in which the speaker utilizes language to create a certain impact in the mind of the listener. He claims that because pragmatics studies meaning in relation to speech situation, five aspects of the situation must be considered: addresser and addressee, context of an utterance, goal of an utterance, utterance as a form of act, utterance as a product of verbal act, and utterance as a product of verbal act.

2.1.3 The Scope of Pragmatics

Pragmatics, as a discipline of linguistics, encompasses a wide range of concepts, including deixis, presupposition, cooperative principle, implicature, speech act, and politeness (Yule, 1996). In a summary, pragmatics is concerned with utterances that refer to specific occurrences, the purposeful acts of speakers at certain times and locations, generally including language. It also generally investigates how language is employed during a conversation. Because of the pragmatic interests in the link between the language used and the language user in a scenario setting, it is frequently associated with acts or communicative action which are function actions of speaking as well as politeness.



2.2 Speech Acts

The verbal expressions that people employ in daily life include the use of body language, including the use of the hands, eyes, head, fingers, and other parts of the body. It does actions in addition to delivering a speech. We must make it clear how the utterance is supposed to conduct actions in order to make it stand out. The locutionary act, illocutionary act, and perlocutionary act are the three primary meanings which one is doing something when they are saying it, according to Austin (Levinson, 1983).

2.2.1 Locutionary act

A locutionary act is the behavior of a person producing words or producing meaningful language expressions. When the user uses his or her speech organ to produce speech, then there is a speech act in the middle of his or her speech. In other words, locutionary act is the act of the speaker using speech organs to produce speech.

2.2.2. Illocutionary act

Every utterance must have a function. The function or meaning of discourse is called illocutionary act. For example, the sentence "I promise to give you another chance", which is not only a statement, but also constrains what the speaker said just now. This is because the intent of words is that the speaker will do something. Therefore, the illocutionary act mentioned above is an act of promise.

2.2.3. Perlocutionary act

A perlocutionary act is the effect of the speaker on the words spoken by the listener. For example, "Please open the door". in that context when the speaker expresses that he wants to do something to the listener. As an effect of the utterance, the listener does this to help open the door for the speaker.

2.3 Classification of Illocutionary Act

The five categories of illocutionary acts that currently provide the structure for speech acts were categorized by Searle. Which are:

2.3.1. Representative

In a representative speech, the speaker states or expresses whether they agree with the case being made or not, according to Searle, cited in Yule (2017). Examples of this type of statement are "agree," "deny," "affirm," "allegation," "announce," "believe," "boast," "complain," "conclude," "forecast," "inform," "insist," "predict," "report

2.3.2. Directive

Directive speech is used by speakers to persuade listeners to do something. The verbs advice, ask, beg, bid, command, demand, forbid, order, recommend, and request are examples of Searle in Verbs designating members of this category.

2.3.3. Commissive

Commissive speech refers to verbal commitments made by speakers to carry out future actions Searle, cited in Yule (2017). Commissive clearly states the speaker's intentions. Offer, promise, swear, threat, and volunteer all fall under this category.

2.3.4. Expressive



Speech that is expressive expresses the speaker's feelings. It expresses psychological states and can include declarations of joy, happiness, sorrow, or likes and dislikes.

2.3.5. Declarative

Declarative speech is a type of illocutionary act that has the power to alter the world through the words it produces. Declarative speech acts, according to Searle, cited in Yule (2017), have the power to alter the course of history with language. Adjourn, appoint, baptize, christen, declare, communicate, name, resign, sentence, and veto are verbs that fall under the category of declaration.

2.4 Classification of perlocutionary Act

According to Prachanant (2021), Perlocutionary acts are performed with the intention of producing a further effect on the hearer. Moreover, some effects of the perlocutionary acts are the following:

2.4.1 Hearer knows something: As a result of experience or because he or she has learned or been informed, a listener knows or realizes something in his or her mind, particularly information.

2.4.2 Hearer thinks of something: When a listener uses his or her thoughts to examine what a speaker says, he or she has a specific idea or opinion about something or someone.

2.4.3 Hearer is doing something: A listener is doing something because the speaker expects or causes him or her to do so.

2.4.4 Hearer is convinced: The speaker presents a good reason for the listener to believe something.

2.4.5 Hearer feels irritated: A listener is irritated because the speaker annoys him or her by making assertions that irritate him or her slightly.

2.4.6 Hearer feels frightened: A listener is terrified because the speaker frightens him or her with his or her statement.

2.4.7 Hearer is amused: The speaker amuses the listener by making him or her laugh, grin, or think that someone or something is humorous.

2.4.8 Hearer is inspired: A listener is inspired when he or she receives the speaker's encouragement, spirit, or idea.

2.4.9 Hearer is impressed: A listener is impressed when the speaker inspires admiration or respect in him or her because of something the speaker has done or said.

2.4.10 Hearer is attracted: A hearer is attracted because the hearer recognizes and gets the attention to what the speaker said.

2.4.11 Hearer relieves tension: A hearer removes tension to reduce or decrease an unpleasant sensation, anxiety, or suffering, or to make a problem less important.

2.4.12 Hearer is giving an answer: A hearer answers as a reaction to a question or situation.

3. Methodology

3.1 Samples

The samples were 20 scenes chosen randomly from the entire movie using a systematic random sampling method. Samples were selected by counting by 4.



The number of the scenes included 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, and 80.

3.2 Method of Data Collection

The data source of this research was collected from Soul animation. The research instrument comprised of the animation script that the researcher downloaded from scriptspdf.net. The researcher read it in detail then selected the scenes for coding by using systematic random sampling method to get 20 scenes.

After the data has been collected, the following step was processing and analyzing the data. The data was classified into the kinds of illocutionary act according to Searle's categories of illocutionary act; representative, commissive, directive, expressive, and declaration. Furthermore, the data was also describing perlocutionary acts according to Austin (1962).

The second research tool was a table of coding. The coding table was used by the researcher to assess and code illocutionary and perlocutionary act. They were classified in the coding table by the researcher.

The last research tool used in this study was a coding guideline. A coding guideline was a tool that allowed research advisers and English specialists to assess the correctness and accuracy of the researcher's coding results. Furthermore, the research advisers and specialists could have an easier time comprehending all of the researcher's coding techniques.

3.3 Data collection

First, the researcher gathered data by reading the script and then watching the animation on the Disney Hotstar application to count the scenes. Then read the scripts and watched them again to gather the illocutionary acts which were produced by the main character. After that, the researcher categorized it based on the speech acts by Searle (1969) that included assertive, directive, commissive, expressive, and declarative. Moreover, the researcher watched the animation again and focused on the perlocutionary acts which were produced by the interlocutors and then categorized the perlocutionary of Joe's interlocutor based on Austin (1962).

3.4 Data analysis

3.4.1 Coding

The researcher read the script and categorized the key discourse components for illocutionary and perlocutionary behaviors. Then watched the movie comprehensively and focused on the illocutionary and perlocutionary acts. All data were coded using speech act procedures.

3.4.2 Categorization

The classifying step involved grouping the data and categorizing it according to the types of illocutionary and perlocutionary acts. In essence, categorizing the data into various parts of illocutionary acts that were presented in tables. The researcher associated the collected data with any condition or sequence that was relevant to the research question under consideration.

3.4.3 Statistics used



In order to define frequency and percentage. Statistical analyses would be carried out by using SPSS program.

An initial quantitative examination of the numerical distribution of speech act types explained by each type will be performed. Descriptive statistics such as frequency and percentage were used.

4. Results

Based on the research objectives, the results of data analysis were as follows:

4.1 Type of illocutionary acts

Table 1
Illocutionary Acts Record

Illocutionary acts		
Types	Frequency	Percentage
Rep	12	60.00%
Dir	7	35.00%
Com	4	20.00%
Exp	1	5.00%
Dec	0	0.00%

The table 1 presents the frequency and the percentage of illocutionary act occurred in the movie. Based on the finding above, the most dominant illocutionary act was representative with a total of 12 times or 60.00%. Following by directive for 7 times or 35.00%, commissive for 4 times or 20.00%, expressive for 1 time or 5.00% and declarative weren't found in this study.

4.2 Types of perlocutionary acts

Table 2
Perlocutionary Acts Record

Perlocutionary acts		
Types	Frequency	Percentage
HKS	5	10.00%
HTS	2	25.00%
HDS	5	10.00%
HC	1	5.00%
HI	2	10.00%
HF	0	0.00%
HIN	1	5.00%
HIM	0	0.00%
HA	0	0.00%
HRT	1	5.00%
HAN	6	30.00%
HAT	0	0.00%

Table 2 presents the frequency and the percentage of perlocutionary act occurred in the movie. Base on finding above, the most dominant perlocutionary acts is hearer is giving an answer ($f=6$, 30%). Followed by hearer thinks of something ($f=5$, 25%), hearer knows something ($f=2$, 10%), hearer is doing something ($f=2$, 10%), hearer is feels irritated ($f=2$, 10%), hearer is relieves tension ($f=1$, 5%), hearer is convinced ($f=1$, 5%), and hearer is inspired ($f=1$, 5%).

5. Discussion

This section concerns the discussion of the findings in the following points:

5.1 Types of illocutionary acts produced by the main character in Soul animation movie.

The findings of the investigation discovered that the main character produced various of illocutionary acts. According to Searle theory (1969), there were five types of illocutionary acts including representative, directive, expressive, commissive, and declarative. The result revealed that the main character produced only four types of illocutionary acts which was similar to other research completed by Saputro (2015), Ramayati (2018), and Effendi (2022) that found four types of illocutionary acts including representative, commissive, directive, and expressive and they did not find declaration because the character did not used any utterance that makes propositional content corresponds with the reality. On the other hand, the research completed by Sihombing (2021), Setiani & Utami (2018) found five types of illocutionary acts because the character used the declaration in the movie.

Moreover, the result of the study also shown that the most frequent illocutionary acts occurred in the movie was representative. Based on the finding, the illocutionary act of representative was often used by the main character in his utterances because he had accident, and he was not ready to die. So, when he turned into soul, he tried to explain to the interlocutors.

5.2 Types of perlocutionary acts produced by the interlocutors in Soul animation movie.

Based on Austin's theory, the perlocutionary acts are divided into twelve categories. The investigation's results showed that the interlocutors committed a variety of perlocutionary acts. There were eight types of perlocutionary acts occurred in the movie. The most frequent perlocutionary acts was HAN (the hearer is answering the question). It represented that the interlocutors often answered the main character's questions. The main character tried to find the way back to his body after he turned into soul because he wanted to play piano in the club. So, when he found someone, he usually asked questions which enforce the interlocutors to answer. But the interlocutors answered not only in word, but they also sometimes just performed some gesture and it classified as HAN (the hearer is answering the question) too.

6. Conclusion

After analyzing the data. The researcher found the illocutionary acts and perlocutionary acts occurred in The Pixar's animation movie "Soul". The illocutionary acts are divided into five indicators including representative, directive, commissive, expressive, and declarative. The perlocutionary acts are



categorized into twelve indicators including hearer knows something (HKS), hearer thinks of something (HTS), hearer is doing something (HDS), hearer is convinced (HC), hearer feels irritated (HI), hearer feels frightened (HF), hearer is amused (HA), hearer is inspired (HIN), hearer is impressed (HIM), hearer is attracted (HAT), hearer relieves tension (HRT), and hearer is giving an answer (HAN).

In this study, the most dominant the most dominant illocutionary act was representative and followed by commissive and directive. On the other hand, the declarative doesn't occur in the movie. Moreover, there are only eight perlocutionary acts produced by the interlocuter. The most percentage was hearer is giving an answer (HAN) (30%). Then hearer is thinks of something (HTS) (25%) is the second. After that, hearer is knowing something (10%), hearer is doing something (10%), hearer feels irritated (10%) are the same percentage. And hearer relieves tension (5%), hearer is convinced (5%), and hearer is inspired (5%) occurred only once in the movie.

7. Recommendation

6.1 The researcher would like to suggest a few ideas based on the findings. the researcher hopes that by explaining the different types of perlocutionary and illocutionary acts, the reader would gain a better understanding of these terms. Readers can use this research as a resource to learn more about this subject, it is hoped.

6.2 For the further research, the researcher hope it will encourage additional investigation into illocutionary and perlocutionary techniques in films and other literary works. And the researcher expects other researchers to analyze more about speech acts with different methods, materials, and designs of research to explore more about this topic.

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The Obstacles and Difficulties of Myanmar Researchers in Academic Publishing

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Abstract

Academic publishing plays a vital role in supporting researchers and advancing systematic high-quality research. Most educational efforts are published in academic journal article, book or thesis form. Knowledge enrichment represents the main purpose of conducting academic research in any discipline. Sharing research through national and international platforms / outlets can best achieve such a purpose. This study is conducted to explore the challenges of academic research and publishing papers in national and international research journals. A quantitative approach was adopted in this study using a questionnaire to gather primary data. Probability sampling method is used in this research. The sample of the study involved 168 academic researchers from different Arts and Science Universities in Myanmar. The outcomes of the study displayed that researchers at universities fought against many obstacles during different stages of conducting research, such as limited number of studies to draw from; limited exposure to international scholars' work and lack of knowledgeable collaborators; need for high quality writing; difficulty in becoming members of research community; costs of collecting data as well as inexistence of encouragement for national and international publications; limited publication outlets and lack of applicable theory and lack of high-quality research journals. The results also revealed that publishing research in research journal was dominant in Myanmar due to many challenges, including long time and high costs associated with national and international publishing. The study has concluded some practices for coping with challenges to academic research.

Keywords: Obstacles, Academic publishing, Myanmar, researchers

1. Introduction

The publish-or-perish system, then, helps promote accuracy in academia by requiring researchers to submit to high-quality, peer-reviewed journals. Thus, many view publishing as a moral requirement. Since the public funds public universities, the research they produce should be available to the public. The research journals are concerned with distribution of correct results, on right time to right people. On the other hand, they undertake to observe ethic and rules of publication. The researchers are concerned with publication of their results in a valuable journal with high rank. It is important for every researcher to publish articles in the research journals in order to get recognition for his / her work, earn his / her academic promotion, attract new funds for new research, and maximize effects on present and future research. Another challenge with regard to primary data collection was that for qualitative research: there is a need to



spend time in the field to understand the dynamics of the country. Finally, an expert explained that in the case of Myanmar, there are clusters of Myanmar based scholars who form relatively closed camps, and are unreceptive to new work. This highlights the lack of potential research collaborations that characterize emerging economies (Fastoso and Whitelock, 2011). Academic publishing lives in challenging times. Society wants published science to advance mankind with believable progress. Publication of high-quality papers is the obvious answer. This is a big obstacle, since there is no good universal metric for quality. A working model could be to publish “novelty that moves the field forward.” Publishing in a high impact factor journal does signify a higher quality paper, but such journals also have a higher number of retractions. The review process is an attempt to ensure that the data are robust, unbiased, and obtained with a rigorous, repeatable methodology. Without attempting to present a comprehensive list of the burdens impending upon the processes and products of academic publishing, below is an account of factors that might be familiar to those working in research settings. These are presented the following framework of the “Five Ws and one H” under the banner of “gold” open access:

Why? The “golden rule” should be that one should publish when there is something relevant to say. Yet, academic competition, performance reviews and career progressions linked to number of outputs, citation indices, and impact factors might severely impinge on this rule.

Who? The list of authors of a paper should theoretically correspond to those that have actively contributed to its completion. However, common ill-practice at Universities suggests that this might not always be the case.

What? The quality of a study should be based first and foremost on sound literature review, rigorous and detailed methodology, replicable results, and conclusions that are relevant to the discipline. This should also imply access to collected data to support meta-analysis founded on estimation of comparable standardized indicators. Nevertheless, conclusions are frequently based uniquely on preliminary inferences, hindering results’ verification and the utilization of acquired knowledge to inform further studies.

When? The relevance of publication “speed” clearly differs based on discipline. But certainly, the time required by processes such as ethical approval, data gathering and examination and, above all, rigorous peer-reviewing and editorial procedures represent a challenge that researchers should always consider for the timely dissemination of their new findings.

Where? In addition to the mentioned criteria linked to impact factors and citation indices, before selecting a journal where a study is submitted, a question should be raised whether its publishers are effectively serving the needs of their audience. More and more, financial aspects seem to triumph over scientific integrity, with a “plethora” of new journals appearing, almost daily, under the pledge of short-term publishing and straightforward reviewing. Although this might deceptively meet some of the challenges listed above, it is only on editorial independence, consistency and continuity towards the aims and scope of a publication, and, most importantly, a serious review process that constructively challenges the study contents, that the advancement of knowledge can be effectively guaranteed.



How? Increasingly, Universities require for new science to be widely and freely disseminated, under the banner of “gold” open access. Although this principle is commendable, this demand also often implies exorbitant fees imposed by publishers that are very frequently unreachable by young scholars, or those performing fundamental research in less prosperous academic contexts. Together with the others, this is a challenge that the entire research community should urgently consider to avoid “*perishing*” under the pressures of publication.

Nowadays, on the one side publishers and on the other side researchers are faced with variety of challenges. The literature was searched with the help of conference proceedings, data bank, and also searches engines available at Google, Google scholar.

A major challenge in conducting research in Myanmar is the replication of previous findings in literature in Myanmar context and the lack of prior knowledge and education on how to conduct quality research that will be accepted by major publication outlets.

1.1 Challenges Faced in Publishing Research

1.1.1 Limited Number of Studies to Draw from

With regard to the limited number of studies to draw from as a literature based on which to rest one's study the experts recognized this as a weakening problem. This is a function of increasing emphasis placed on scholarly research at universities, and the rising interest by emerging in scholarly research that they increasingly believe will actually help them grasp problems and understand opportunities more effectively.

1.1.2 Limited Exposure to International Scholars' Work and Lack of Competent Collaborators

The second issue relates to a limited exposure to international researchers' work. As an expert explained, it is common to travel and present in research seminars and there are much less appropriate outlets, which means that one's work is less likely to be enjoying high-quality feedback and potential reviewers will not get a sense of one's work. Given the poor / unconventional training of local researchers, a lack of competent collaborators was highlighted as an additional challenge.

1.1.3 Need for High Quality Writing

When speaking about reviewers, people who are writing in a second language simply must run their work by a good technical editor before they send it to the journal, or they risk having it rejected at the editor's desk, with no opportunity for resubmission. Notably, many universities have become aware of this problem and an English proficiency exam is required before taking a position at the university in some countries.

1.1.4 Difficulty in Becoming Members of Research Community

Fourth, experts recognized the difficulty of becoming members of research clubs. Many research papers that are not in the primary interest of establishment



are easily rejected, hence many capable native researchers rather pursue questions.

1.1.5 Costs of Gathering Data as well as Inexistence of Incentives for International Publications

With regard to costs of collecting data, the experts mentioned temporal issues arising from delayed communication with partners. Extensive training of individuals conducting surveys in the native language and verification of this training were also discussed. Finally, costs of collecting data may increase due to a great deal of government interference. Teachers are still learners and have divided attention. Furthermore, there are no incentives for publications at high international level: incentives for research excellence do not distinguish between international high-quality journal publications and lower-quality locally accredited journals.

1.1.6 Limited Publication Outlets and Lack of Applicable Theory

An expert argued that there are few highly reputed international journals that accept qualitative research, even case method-based research and international journals still prefer standard articles that use well-proven statistical methods, while deviations tend to reduce the quality of the article in the eyes of reviewers. This issue led him to the challenge: as much work is case-based and/or not theoretical, it is hard to find theoretical hooks.

1.1.7 Lack of High-quality Research Journals

Another expert added that publication in high-quality journals is challenging. The potential of publication can be increased if the background and findings from the study is put into the context, but brute force is not used to fit existing theory on the other context. Thus, experts agreed it is best for researchers to frame and reframe their work to join a conversation already started in developed countries, by (1) using the context as a background for the research and (2) being clear about the contribution.

1.1.8 Negative Reviewer Comments

Peer review is at the heart of academic publishing and has long been instrumental in bringing good quality to the forefront. Peer reviewer comments offer authors with valuable suggestions to improve their manuscript; thus, even a rejected manuscript with constructive reviewer comments is highly valuable. However, peer reviewer comments can sometimes be negative, rather than positive, damaging authors' motivation and confidence levels.

As noted by a respondent, there appears to be a bias in many of the best marketing journals towards research about developed countries. Even when studies are based on data from other countries, there appears to be a bias towards publishing research based on the approaches that were taught to students during their research programs. While this explanation is speculative and requires additional research, several examples should illustrate the intuitively appealing nature of this explanation.



2. Research Objectives

This research aims

2.1 to explore whether the researchers in Myanmar know or recognize well the factors that should be familiar with those in research setting.

2.2 to explore the challenges of academic research and publishing papers in national and international research journals.

3. Research Methodology

3.1 Samples

The total sample included 168 respondents. The teachers involved were 35 to 58 years old and has been teaching in the university for 10 to 31 years.

3.2 Research Instruments

The instrument used in this study was the framework of the “Five Ws and one H” under the banner of “gold” open access and the questionnaires concerned with the challenges of conducting and publishing research articles. The framework of the “Five Ws and one H” include the facts that should be familiar to those working in research settings.

3.3 Data Collection

The study employed a quantitative method. A questionnaire with predominantly closed ended questions was used to collect the quantitative data. Probability sampling method was used in this research. The data collection was conducted in selected universities in Myanmar. The survey was conducted in 2019 for the topic.

3.4 Data Analysis

The Statistical Package for the Social Sciences (SPSS) was used to analyze quantitative data from the participants. Some frequencies and percentages generated using SPSS were exported MS Word to produce tables. In this study, data collected using questionnaires from the participants was used to confirm and the conclusions of the study were drawn based on the findings of the data sources. To make sure that the data was lack of errors, it was carefully calculated and presented in tables.

4. Research Results

The research setting can be seen as the physical, social, and cultural site in which the researcher conducts the study. The purpose of this research is to explore the factors that might be familiar with the researchers in research settings and the challenges of conducting and publishing of research papers faced by Myanmar researchers. First and foremost, the researchers in Myanmar know and recognize well the factors that might be familiar with those in research settings. They also know well that the quality of a research paper depends on sound literature review, rigorous and detailed methodology. Secondly, one of the common challenges for Myanmar researcher is negative reviewer comments. The following table shows responses of the participants on the account of factors that might be familiar to those working in research settings.



Table 1
Responses of the participants on the account of factors that might be familiar to those working in research settings (n=168)

S N	The framework of the “Five Ws and one H” under the banner of “gold” open access	Factors that might be familiar to those working in research settings	Responses			Calculation		Interpretation
			Disagree	Not Sure	Agree	Mean	SD	
1	Why?	Academic competition , performance reviews and career progressions link to number of outputs, citation indices.	10%	18 %	72%	2.62	0.66	Recognize them or know them well
2	Who?	The list of authors of a research paper theoretically corresponds to those that have actively contributed to its completion.	9%	16 %	75%	2.66	0.64	Recognize them or know them well
3	What?	The quality of a study is based on sound literature	1%	20 %	79%	2.78	0.44	Recognize them or know them well



S N	The framework of the “Five Ws and one H” under the banner of “gold” open access	Factors that might be familiar to those working in research settings	Responses			Calculation		Interpretation
			Disagree	Not Sure	Agree	Mean	SD	
		review, rigorous and detailed methodology, replicable results, and conclusions that are relevant to the discipline.						
4	When?	Certainly, the time required by processes such as ethical approval, data gathering, and, above all, peer-reviewing and editorial procedures represent a challenge.	11%	9%	80%	2.69	0.66	Recognize them or know them well
5	Where?	A serious review process constructively challenges	25%	22%	53%	2.28	0.84	Wondering where to begin



S N	The framework of the "Five Ws and one H" under the banner of "gold" open access	Factors that might be familiar to those working in research settings	Responses			Calculation		Interpretation
			Disagree	Not Sure	Agree	Mean	SD	
		the study contents to be effectively guaranteed.						
6	How?	The demand also often implies exorbitant fees that are very frequently inaccessible by young scholars	11%	11%	78%	2.67	0.66	Recognize them or know them well
Average			11%	16%	73%	2.62	0.68	Recognize them or know them well

NOTE:

1.00-1.66=Not acquainted with

1.67-2.33=Wondering where to begin

2.34-3.00=Recognize them or know them well

Over the past few years, the state of scholarly publishing – particularly in terms of the publishing of journals – has dramatically changed. This research explores to shine a light on the journal publishing scene in order to learn how researchers, journal editors and publishers are dealing with issues such as Open Access, print vs. online distribution mechanisms, and the day-to-day management of journals. It is important for researchers to be familiar with the above factors in research settings. According to the data, the researchers in Myanmar know and recognize all these factors well. Among them, nearly all of the participants (M = 2.78, SD = 0.44) know well that the quality of a study is based on sound literature



review, rigorous and detailed methodology, replicable results, and conclusions that are relevant to the discipline. Also, most of the participants ($M = 2.69$, $SD = 0.66$) know well the time required by processes such as ethical approval, data gathering, peer reviewing and editorial procedures. Many researchers ($M = 2.67$, $SD = 0.66$) know well exorbitant fees that are very frequently inaccessible by young scholars. These are the factors that demotivate the researchers in Myanmar. Table 2 shows the responses of the participants on challenges of conducting and publishing research in Myanmar.

Table 2
Responses of the participants on challenges of conducting and publishing research in Myanmar (n=168)

S N	Challenges	Sub-challenges	Responses			Calculation		Interpretation
			Disagree	Not Sure	Agree	Mean	SD	
1	Limited number of references to draw from	References that the experts recognized as a weakening problem.	14%	35%	51%	2.37	0.72	Challenging
		Scholarly research that will help them understand opportunities more effectively	14%	27%	59%	2.45	0.73	Challenging
		Avg	14.00%	31.00%	55.00%	2.41	0.72	Challenging
2	Limited exposure to international scholars' work and lack of competent collaborators	Lack of high-quality feedback given by potential reviewers	3%	22%	75%	2.72	0.51	Challenging
		lack of competent collaborators	1%	32%	67%	2.66	0.49	Challenging



S N	Challenge s	Sub- challenges	Responses			Calculati on		Interpreta tion
			Disagr ee	Not Sure	Agree	Me an	SD	
		Avg	2.00%	27.00 %	71.00 %	2.6 9	0.5 0	Challengin g
3	Need for high quality writing	Lack of a good technical editor BEFORE they send it to the journal	10%	30%	60%	2.5 0	0.6 7	Challengin g
		Lack of an English proficiency exam before taking a position at the university	14%	32%	54%	2.4 0	0.7 2	Challengin g
		Avg	12.00 %	31.00 %	57.00 %	2.4 5	0.7 0	Challengin g
4	Difficulty in becoming members of research communi ty	Lack of research papers that are in the primary interest	9%	22%	69%	2.6 0	0.6 5	Challengin g
		Poor / unconventi onal training of local researchers	3%	26%	71%	2.6 8	0.5 3	Challengin g
		Avg	6.00%	24.00 %	70.00 %	2.6 4	0.5 9	Challengin g
5	Costs of gathering data as well as inexisten	No incentives for publications at	5%	22%	73%	2.6 8	0.5 6	Challengin g



S N	Challenge s	Sub- challenges	Responses			Calculati on		Interpreta tion
			Disagr ee	Not Sure	Agree	Me an	SD	
	ce of incentive s for internatio nal publicatio ns	international level						
		No incentives for research excellence to distinguish between international high-quality journal publications and lower-quality locally accredited journals.	7%	30%	63%	2.56	0.62	Challenging
		Avg	6.00%	26.00%	68.00%	2.62	0.60	Challenging
6	Limited publication outlets and lack of applicable theory	Few highly reputed international journals that accept qualitative research with the use of well-proven statistical methods,	19%	28%	53%	2.34	0.78	Challenging
		Hard to find theoretical hooks.	14%	35%	51%	2.37	0.72	Challenging
		Avg	16.50%	31.50%	52.00%	2.36	0.75	Challenging



S N	Challenge s	Sub- challenges	Responses			Calculati on		Interpreta tion
			Disagr ee	Not Sure	Agree	Me an	SD	
7	Lack of high-quality research journals	Publication in high-quality journals is challenging .	8%	21%	71%	2.63	0.63	Challengin g
		Lack of fitness existing theory	4%	30%	66%	2.62	0.56	Challengin g
		Lack of framing and reframing for the research to be clear about the contribution.	15%	24%	61%	2.46	0.74	Challengin g
		Avg	9.00%	25.00%	66.00%	2.57	0.65	Challengin g
8	Negative reviewer comments	Negative peer reviewer comments damaging authors' motivation and confidence levels.	4%	17%	79%	2.75	0.52	Challengin g
		Lack of provision with valuable suggestions to improve their manuscript ;	5%	14%	81%	2.76	0.53	Challengin g



S N	Challenge s	Sub- challenges	Responses			Calculati on		Interpreta tion
			Disagr ee	Not Sure	Agree	Me an	SD	
		Avg	4.50%	15.50 %	80.00 %	2.7 6	0.5 2	Challengin g

NOTE:

1.00-1.66=Easy to deal with

1.67-2.33=Getting ready for the challenge

2.34-3.00=Challenging

This study aims to examine the reasons of the shortcomings of research attention. The objective of this study is to determine the reasons for and implications of the absence of research studies in outstanding international journals with a specific emphasis on the challenges in conducting and publishing research. The most talked about challenges in conducting research in Myanmar were negative reviewer comments ($M=2.76$, $SD = 0.52$), limited exposure to international scholars' work and lack of competent collaborators and availability of a network of researchers ($M = 2.69$, $SD = 0.50$) and difficulty in becoming members of research community ($M = 2.64$, $SD = 0.59$). The significant challenge also includes the presence of network for researchers. Negative reviewer comments were ranked high. Through a discussion with researchers in Myanmar, authors were asked to share their experiences with negative reviewer comments; 80% of participants responded. These responses were analyzed on the basis of their underlying emotion or message. The responses indicate that they appreciate receiving constructive reviewer comments and benefit from such comments. However, authors are often demoralized when they receive comments that are superficial, harsh, or overcritical, and do not provide constructive suggestions for improvement. Moreover, the participants responded that they are limited exposure to international scholar's work and they can't get easily competent collaborators. They also found difficulty in becoming members of research community

5. Discussion

The challenges of academic research and publishing papers in national and international journals are considered in this research. To reiterate, our study confirms the reasons why Myanmar has been under-researched and beyond these studies by systematically mapping the most contemporary research issues in the region. While the experts argued that some challenges are similar across all the world regions: the limited number of studies to draw from, limited exposure to international scholars' work and lack of competent collaborators, need for high quality writing, costs of gathering data as well as inexistence of incentives for international publications, limited publication outlets and lack of applicable theory, lack of high-quality research journals and negative reviewer comments. One of the main issues found among the academic researchers in Myanmar is



negative peer reviewer comments. Nearly all of the participants responded that this is the most challenging factor for them. Therefore, it can be seen that negative comments of peer reviewers can sometimes damage the authors' motivation and confidence levels. Thus, results obtained from Myanmar surveys can be used as a case unless they support theoretical models. While it is true that peer review work claims a lot of time and energy from busy scientists, the purpose is lost when reviewer comments are purely negative. If peer reviewers could keep in mind the feelings of authors while drawing up their reports, peer review would become more effective and a more positive experience for authors. Other challenges that the researchers face are limited exposure to international scholars' work and lack of competent collaborators and difficulty in becoming members of research community. To this point, the researchers from Myanmar need to be given relevant research training workshop. They also need to attend research seminars from different countries and collaborate with other researchers from different countries. According to the data, one of the most common challenges that the researchers should always consider is the time required for data collecting, peer-reviewing and ethical approval. Moreover, what worries the researchers from Myanmar is whether they can finish their researches in time. They also need to think of choosing the relevant and sound literature review, detailed methodology and results and conclusions that are suitable for the discipline.

6. Conclusion

The study is conducted to explore whether the researchers in Myanmar know or recognize well the factors that should be familiar with those in research setting and the challenges of academic research and publishing papers in national and international journals. According to this study, it can be concluded that the researchers in Myanmar know or recognize well these factors and the most challenging factor for them is negative peer reviewer comments. They also found limited exposure to international scholars' work and lack of competent collaborators and difficulty in becoming members of research community.

7. Recommendations

Based on the research results, the following are some recommendations:

7.1 The study recommends that the educational institution should encourage the researchers to collaborate with international scholars and expose the work of international scholars as much as they can.

7.2 It is recommended that the institution should arrange research webinars and trainings for the researchers in Myanmar.

7.3 It is also recommended that the institution should raise funds for the researchers.

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THE DEVELOPMENT OF ENGLISH FACEBOOK FAN PAGE TO PROMOTE BURIRAM SUSTAINABLE PRODUCTS IN KHAO MAO COMMUNITY

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Abstract

The purposes of this study were to 1) analyze the needs on the English Facebook fan page to promote products of Khao Mao Community members, 2) develop the English Facebook fan page to promote Khao Mao Community products, and 3) evaluate the satisfaction toward the English Facebook fan page of Khao Mao Community members and visitors. The target group for the need and development of the English Facebook fan page was 20 Khao Mao Community members. They were selected by using a purposive sampling technique. Furthermore, the target group for evaluating satisfaction with the English Facebook fan page was 87 members and visitors who work and visit at Khao Mao community. They were selected by using the convenience sampling technique. The research instruments were semi-structured interviews, a translation form, a Facebook fan page evaluation form, and a satisfaction questionnaire. The quantitative data were analyzed by using percentages, mean, and standard deviations, while the qualitative data were analyzed by using content analysis. The results revealed that:

1. The level of needs on the English Facebook fan page for promoting the products of the Khao Mao community members was found at a high level.

2. The characteristic of English Facebook fan page development included text, images, and videos to promote Buriram sustainable products in Khao Mao community.

3. The satisfaction of Khao Mao community members and visitors toward the English Facebook fan page to promote the community's products were found at a high level.

Keywords: English Fan Page, Sustainable products, Khao Mao Community

1. Introduction

English is one of the most influential languages in the world (Baugh & Cable. 1993). According to Kostic and Grzinic, "English has become an



international language because it is increasingly necessary for employees working in tourism to develop their language skills in order to meet the needs of tourists." Furthermore, English is used to transfer ideas and cultures and to foster positive relationships between people from different countries (Prachanant. 2012). According to Sharafuddin (2015), tourism is one of Thailand's most important industries. Moreover, international tourism, Thailand's most valuable source of foreign exchange revenue, is becoming increasingly influential in connecting Thailand to regional and global networks (Kontogeorgopoulos. 1998). Buriram has become a well-known sports destination since 2011, with the establishment of the Buriram Football Club and the Chang International Circuit in 2014. As a result, Buriram's tourist destination image has shifted slightly from historical to sporting. Furthermore, these new sites are owned by the private sector.

Facebook is a popular social media platform that is used by both the demand and supply sides of the tourism industry (Onder, Gunter & Gindl. 2019). Facebook recently added support for home services to its marketplace platform. This update enables home service professionals to market their services in their local areas to Facebook users worldwide who have similar interests (Hendirek, Satal, Lorin, Zaidi & Musa. 2021). The Khao Mao Community is located in Nong Sano subdistrict, Nang Rong district, Buriram province. Farmers, the villagers of Khok Wan, produce "Khao Mao" for sale. "Khao Mao," or pounded unripe rice, is a popular dessert made from milk and old phases of sticky rice. Unfortunately, there is no English fan page for Khao Mao community products for international visitors. Furthermore, English research is limited to promoting Buriram's local products. As Business English students, the researchers are eager to create an English fan page to promote Khao Mao Community products. This research will provide international visitors with background information and interesting Khao Mao community products. Thus, it is hoped that the English Facebook fan page will aid in promoting Buriram local products and generating income for Buriram residents. Furthermore, the findings of this study can be used to develop an English Fan Page to promote other tourist attractions in Buriram.

2. Tourism in Buriram

According to the Netherlands Embassy, Thailand has one of Asia's most developed tourism markets. Thailand is known for its hospitality, beautiful beaches, historical sites and eco-attractions, world-famous cuisine, good infrastructure, and affordable accommodation. Thailand welcomed a record 32.6 million visitors in 2016 and is expected to remain the top tourist destination in the coming years. In Thailand, community tourism is visiting local or indigenous communities to purchase various goods and services (Boonratana, 2010). However, tourism products and services comprise independently owned, developed, and managed businesses. As a result, the local community may not benefit collectively from tourism, and the benefits of tourism are primarily in the form of economic returns.

The Tourism Authority of Thailand, Buriram Office (2019) defines Buriram as a pleasant city. Buriram is unique in its history as a city with abundant sandstone sanctuaries of ancient Khmer culture and a natural destination and is known as a passthrough city. Its heritage enhances the strength of local economies



through tourism, encouraging local people to be proud of their local culture by learning about their local legends. It also tests whether or not a tourist trail that links tangible and intangible heritage is a suitable type of community-sanctioned heritage, keeping alive local beliefs and providing a sustainable economic and cultural future for those along the trail (Kullapat, 2014; Leruksa and Chaigasem, 2019). Furthermore, a community aims to enable visitors to increase their awareness and learn about the community and local ways of life. Moreover, it can be defined as the city of sport tourism, which is an innovative model for international sports events in the city of Buriram Province.

3. Needs Analysis

Brindley (1989) divides needs into objective needs and subjective needs. The objective needs can be gathered from various information about learners, such as how they need to use language in real-life communication situations, their current level of language proficiency, and everything they need to learn. Subjective needs, on the other hand, refer to the needs of learners in a learning situation and can be understood from affective and cognitive factors such as learners' personality, confidence, attitudes, wants, expectations regarding learning English, cognitive styles, and learning strategies. To summarize, in this study, needs are the feelings that Khao Mao Community members in Ban Khok Wan, Nong Sano Subdistrict, Nang Rong District, Buriram Province require for fulfillment due to their reason, lack, environment, material, motivation, and social background.

4. Satisfaction

Oliver (2010) defines satisfaction as the consumer's fulfillment response. It is a determination that a product/service feature or the product/service itself provides (or is providing) a pleasurable level of consumption-related fulfillment, including levels of under or over-fulfillment. In this study, satisfaction refers to Khao Mao community members' and visitors' feelings of happiness toward the English fan page in terms of content related to the process of making Khao Mao from the past to the present, the history of Khok Wan village, the location of Khok Wan village, the slogan of Khok Wan village, and the benefits of the product, which are presented via video and still images. It consists of the profile's appropriateness (font size, font style, font color, and content), the fan page cover's appropriateness (font size, font style, font color, and content), language usage, and application.

5. Facebook

Facebook is a popular social media platform used by both the tourism industry's demand and supply sides (Onder, Gunter & Gindl. 2019). Facebook recently added support for home services to its marketplace platform. This update enables home service professionals to market their services in their local areas to Facebook users worldwide who have similar interests (Hendirek, Satal, Lorin, Zaidi & Musa. 2021). Tourism's economic benefits include expanding business opportunities for the poor, expanding employment and wages by ensuring commitments to local jobs and training local residents, and developing collective community income (Richardson. 2010).



6. Khao Mao Community

Khao Mao Community is located at Moo. 1, Nong Sano sub-district, Nang Rong district, Buriram province. It is 43 kilometers and takes about 30 minutes to drive from Buriram city. There are three villages, Buta Wes, Bukram, and Khok Wan, together with 20 members in Khao Mao Community. The villagers in Khok Wan are farmers producing “Khao Mao” for sale. “Khao Mao” or pounded unripe rice popularly, is made from sticky rice in milk phases. Besides, there is limited English research on promoting Buriram local products.

7. Research Objectives

6.1 To analyze the needs on the English Facebook fan page to promote the products of Khao Mao Community members.

6.2 To develop the English Facebook fan page to promote Khao Mao Community products.

6.3 To evaluate the satisfaction toward the English Facebook fan page of Khao Mao Community members and visitors.

8. Research Methodology

8.1 Target group

The target group for need on the English fan page was 20 Khao Mao Community members who were selected by using a purposive sampling technique.

The target group for evaluating satisfaction with the English fan page included 87 members and visitors who work and visit at Khao Mao community. They were selected by using the convenience sampling technique.

8.2 Research Instruments

The research instruments were semi-structured interviews, a translation form, a Facebook fan page evaluation form, and a satisfaction questionnaire. The semi-structured interviews were used to obtain in-depth information on the needs and characteristics of the English Facebook fan page to promote Buriram sustainable products in the Khao Mao community. A Translation form and a Facebook fan page evaluation form were used for translating and evaluating the source language as Thai to the target language as English. Finally, a satisfaction questionnaire was used to evaluate the satisfaction of Khao Mao community members and visitors toward the English Facebook fan page.

8.3 Data Collection

First, the semi-structured interview guide was administered to 20 members of Khao Mao community in Ban Khok Wan, Nong Sano Subdistrict, Nang Rong District, Buriram Province. The Thai version was used to interview the members. Each of the 20 interviewees was interviewed for approximately 15 minutes. Each interview was recorded and would be reviewed afterward. After the interview was completed, the voice records were transcribed. Finally, the 87 members and visitors were informed of the interview objectives and then required to fill out the satisfaction questionnaire.

8.4 Data Analysis

The quantitative data were analyzed by using percentages, mean, and standard deviation. The qualitative data were analyzed by using content analysis.



9. Research Results

9.1 Needs on the English Facebook Fan Page to Promote Khao Mao Community Products

The target group of need on the English Facebook fan page consisted of 20 Khao Mao Community members. According to the needs on the English Facebook fan page, the result showed that there were 10 members (50%) who were interested at the highest level, followed by 7 members (35%) who were interested at a high level, and 3 members (15%) who were interested at a moderate level, respectively. Besides, there were 6 products found in Khao Mao Community: Khao Mao Pro, Khao Mao Kluk Benjarong or five colorful Khao Mao, Crunchy Khao Mao Khua, Khao Mao Gra Ya Saat, Khao Mao Cereal, and Khao Mao Mee Samunphrai or Thai herb Khao Mao. Khao Mao Community sold products via an enterprising third party and online media such as a Thai Facebook fan page. The formats of multimedia that the members needed were images and video. Since they only had pictures to promote Khao Mao Community products in the Thai language, the English multimedia to promote products were needed at a high level ($\bar{x}=4.35$).

9.2 Characteristics of the English Facebook Fan Page to Promote Khao Mao Community Products

The contents required in the English Facebook Fan Page to Promote Khao Mao Community Products were Khao Mao Community's background information and products, such as the history of Khao Mao Community, the process of making Khao Mao, and the benefits of Khao Mao products. Moreover, the Khao Mao community members needed that information regarding images and English videos with a Thai sub-title. As a result, the researchers created an English Facebook fan page to promote Buriram sustainable products in Khao Mao Community according to Khao Mao community members' needed content. Furthermore, the English Facebook fan page was evaluated by 5 experts in order to check its efficiency. As a result, the correctness and appropriateness of the images and the English Facebook fan page obtained was 1.00 (S.D. = 0.00). This was shown that the English Facebook fan page to promote Buriram sustainable products in Khao Mao Community, according to Khao Mao community members' needed content, had efficiency.

9.3 Satisfaction toward the English Facebook Fan Page of Khao Mao Community

The level of satisfaction toward the English Facebook Fan Page of Khao Mao Community members and visitors concerning the appropriateness of the page, fan page cover, the language used, and application were found at a high level ($\bar{x}= 4.42$). Furthermore, considering each item, it also indicated that the appropriateness of the page was 4.34 (S.D. = 0.53), the appropriateness of the fan page cover was 4.34 (S.D.= 0.70), the appropriateness of language use was 4.50 (S.D.= 0.70), and the application of the fan page was 4.47 (S.D.= 0.66).

10. Discussion



The need on the English Facebook fan page to promote the products of Khao Mao Community members overall was at a high level ($\bar{x}=4.35$). This could be explained that the needs on the English Facebook fan page to promote products of Khao Mao Community members tend to use English Facebook fan page to provide the background and interesting Khao Mao Community products for international visitors. Hutchinson and Waters (1987) pointed out that target needs include necessities, lacks, and wants. Necessities are also known as objective needs, which may consist of an analysis of typical everyday situations. Lacks can be referred to as the gap between the ending target proficiency and the current level of learners' proficiency. Wants are what the learners want or feel they need. Furthermore, the finding is consistent with Sichan et al. (2021), who studied and developed of English manual for Phanompiman Hotel personnel in Buriram. The result showed that the Phanompiman hotel personnel's needs on the English manual were at the highest level. This study is also consistent with Duanrabram et al. (2020), who studied multimedia development to promote tourism at Sanuan Nok Village in Buriram. Their finding showed that the need on the development of multimedia to promote tourism of Sanuan Nok Village in Buriram was found at a high level.

The researchers constructed the English Facebook fan page to promote Khao Mao community products. First, the researchers reviewed and translated the community's background information and products. After that, the content translated from Thai to English was examined by 3 experts to check the accuracy. Then, the English fan page was examined by 5 experts to check its efficiency, correctness, and appropriateness. The characteristics of the English Facebook fan page consisted of Khao Mao Community's background information and products. There were a history of Khao Mao Community, the process of Khao Mao making, and the benefits of Khao Mao products. Moreover, the Khao Mao community needed that information regarding images and English video with a Thai sub-title. The images and English video with Thai sub-title were developed based on the required contents from Khao Mao Community members. It could be explained that the English Facebook fan page tended to create to promote Khao Mao Community products. Balwani (2009) categorized a successful Facebook fan page into 5 components: networking, resource, contests, empowering pre-existing pages, and targeting the proper demographic. The finding is consistent with Duanrabram et al. (2020), who studied multimedia development to promote tourism of Sanuan Nok Village in Buriram. Their result showed that the characteristics of the English multimedia and fan page of Sanuan Nok Village included the slogan, background, the route to the village, tourist attractions, learning stations, local food, accommodation, products, and souvenirs.

After the English Facebook fan page had been done, the researchers distributed the satisfaction questionnaire to evaluate the satisfaction of Khao Mao community members and visitors toward the English Facebook fan page. The results showed that the target group satisfied the English Facebook fan page overall at a high level ($\bar{x}= 4.42$). Oliver (1980) pointed out that customers' prior expectations would be first formed to purchase a product or service. Second, consumption of or experience with the product or service produces a level of perceived quality that is influenced by expectations. Furthermore, the finding is



consistent with a study by Duanrabram et al. (2020), who studied the development of multimedia to promote tourism of Sanuan Nok Village in Buriram as the results revealed that the satisfaction of Sanuan Nok's villagers overall was found at a high level ($\bar{x}= 4.16$). This finding is also consistent with Kammok et al. (2021), who studied Thai-English translation for village information website development of Muangthale Village, Khaen Dong District, Buriram Province. Their finding showed that the satisfaction of Muangthale village and website visitors overall was found at the highest level ($\bar{x}= 4.69$). In this study, the target group was satisfied with the English fan page at a high level since it was according to their needs. The Khao Mao members were satisfied with the contents needed, while the visitors were satisfied as it got them to realize on the Khao Mao Community better.

11. Conclusion

First, the need on the English Facebook fan page to promote the products of Khao Mao Community members was analyzed and found at a high level. Next, an English Facebook fan page to promote Khao Mao Community products was developed according to the needed content. There were pictures, video, and other information related to the history, process of Khao Mao, and the benefits of the products. Finally, satisfaction with Khao Mao Community products' English Facebook fan page was evaluated by Khao Mao Community members and visitors and found at a high level. The Khao Mao members were satisfied with the contents needed, while the visitors were satisfied as it got them to realize on the Khao Mao Community better.

12. Recommendations

1. The multimedia development to promote other local tourism products in Buriram should be examined in future studies.
2. Future studies should add more research instruments and products, such as manuals and packaging.
3. The comparison of satisfaction among Khao Mao Community members and visitors on multimedia development should be performed in future studies.

The researchers believe this study is advantageous for promoting the human well-being and tourism of the Khao Mao Community. Also, this study's results can be used as a guideline for developing an English fan page to promote other tourist products in Buriram.

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Agrotourism in Chiang Mai Northern Thailand: Current Practices Opportunities, and Limitations

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Abstract

A study of the context of agrotourism in Chiang Mai, Northern Thailand, involving 74 agrotourism locations that had been registered with the Department of Agricultural Extension or the Tourism Authority of Thailand for at least one year. The direct field observation data collection method was a tool for primary and secondary data collection to interview key informants and capture the perspectives of tour operators or position holders of community-based organizations. The researcher applied the five dimensions of the agrotourism concept (RWSAE) of Addinstall et al. (2017) which were: 1) Reason for Being 2) World View 3) Sustainability Context 4) Agricultural Approach 5) Visitor Experience, including recommendations, opportunities, and limitations of farmers through interview. In addition, descriptive statistics were employed for data analysis. It was found that the concept of starting from agriculture alone needs to be learned and adjusted to meet the standards of agrotourism and service. Knowledge, of new agrotourism, is important to study in order to increase the quality of goods and service standards. Joining a group or finding an alliance in the network should be able to fulfill a need that they do not have but that the members of the network have and can meet the needs of more or less basic facilities. Networking also helps with the tourism sector. This increases the appeal of the agrotourism market by providing diverse and unique agricultural tourism activities.

Keywords: Agrotourism, Five dimensions of the agrotourism concept (RWSAE), Practices, Opportunities, Limitations

1. Introduction

Agrotourism originated and developed in Europe, and has been popular since the 1970s in countries such as Norway, Italy, Spain, Israel, Poland, Sweden,



Denmark, Greece, Portugal, Hungary, the Netherlands, and the United States, as well as the United Kingdom and Asia, which includes Japan, Singapore, Taiwan, and Thailand. According to a study of literature data from 1980 to 2019, there were 4598 times cited in Documents, 214 times in Sources (Journals, Books, etc.), 499 times in Keywords Plus (ID), 1162 times in European countries, 1108 times in the United States, and 818 times in the United Kingdom (Rauniyar et al., 2021). Most of them are in developed countries and combine agrotourism with rural tourism. Therefore, the definition of this type of tourism is used differently; "agritourism," "rural tourism," "agrotourism," and "farm tourism" are the first four keywords. Similarities include the fact that it is a source of income for farmers and is associated with agriculture, farming, and rural areas. This is consistent with the research of Bhatta and Ohe, (2020), who found that agritourism in developing countries has become more popular from 2005 onward, as more studies have been published. Many governments use three keywords, "agritourism," "agritourism," and "agrotourism," as key strategies in rural development to increase opportunities for rural people. This is consistent with the results of Muresan et al. (2016), who discovered that tourism is an alternative to rural agriculture, which can attract young people and provide women with the opportunity to establish themselves and work in rural areas, despite certain obstacles that the research by Rambodagedara et al., (2015) aligns with Bhatta and Ohe, (2020), stating that local non-tourist entrepreneurs lack hospitality awareness or there is opposition from locals who think tourism will negatively affect the natural and cultural heritage, generate financial constraints, limited infrastructure, inadequate sanitation facilities in agrotourism, insufficient coordination support from institutions or government due to farmers' limited skills and abilities, no stable market for agrotourism activities and products, and no guarantees of sustainability.

In the context of tourism and agricultural tourism in Thailand, a survey of 85 countries around the world in 2022 found that Thailand is the world's top tourist destination, with Thailand ranked 28th (USNWR, 2022). Tourism accounts for 17% of GDP (2.23 trillion baht per year) (Tourism and Sports, 2016). During 1997-1998, the Thai government began to promote agrotourism, and considering the data of agricultural tourists across the country during 2012-2014, the total average of 268,349 people per year were Thais, 98.24% were foreigners, and 1.76% had income from both service and product sales, totaling 18,224,705 baht per year on average. This was divided into income from services 32.02% and sales of goods 67.98% according to the information of the Community Tourism Promotion and Development Group (2015). According to the research of Praditsangthong et al., (2022), there are 1,215 agricultural tourism sites, including 969 community tourist attractions, 87 government tourist attractions, and the Agricultural Productivity Efficiency Increasing Learning Center (ALC) at 162 locations. The policy before the COVID-19 outbreak in 2018-2020 uses "Thailand is beautiful everywhere, in every style," which is expected to bring tourism at least 3.4 trillion baht. Before the outbreak of COVID-19, Thailand had over 40 million foreign tourists that arrive annually. Moreover, the National Statistical Office (2017), reported that the percentage of Thai tourists aged 15 and over who travel is classified by the activities that they do while traveling. There is



4.3 percent of agricultural tourism, but they have faced the situation of the COVID-19 outbreak in December 2019, in which tourists decreased, both domestic and international tourists, causing the decreased income from tourism in Thailand after the epidemic situation. Tourism is still dependent on outbreak control policies, which open or close the country of origin. It is therefore comparable to entering the next normal era, in which the number and demand of tourists fluctuate constantly and the future is difficult to predict.

The Northern Region of Thailand is the most important to the regional economy, with a total area of 102.48 million Rai, consisting of forestry (52.5%), agricultural land (31.7%), and land use (15.8%). The northern region has an average farm size of 19.1 Rai, according to data from the Office of the National Economic and Social Development Council, 2021. It is a very unique and interesting region, with a diverse lifestyle, diverse culture, mountainous geography, dense forests, fertile river valleys, and a climate suitable for agriculture and agriculture at high altitude. The Northern Region is characterized by natural regions located in mountainous areas. There are two regions: the Upper Northern Region consists of nine provinces, while the Lower Northern Region consists of eight provinces. The Northern Region is characterized by the uniqueness of the Lanna people, with ethnic differences and a diverse and long local way of life. With the proportion of tourists coming to the North during the year 2020, the proportion per country was 14.8 (20.30 million people), worth 93.979.27 million baht; most of them were Thai people, more than 85.2 percent were foreign tourists, 40.9 percent were from Europe and America, and 30.2 percent were Chinese tourists; but due to the spread of the corona virus disease in 2019, tourism in the North in 2020 shrank by 51.9 percent, with Chiang Mai being the main city of tourism. Therefore, the aim or objective of this study is to study the context of agrotourism in Chiang Mai, Northern Thailand, and to identify opportunities, limitations, and recommendations for agrotourism in Chiang Mai, Northern Thailand, as a guideline for further agrotourism activities.

2. Research Objectives

This research consisted of two objectives:

- 2.1. To study the context of agrotourism in Chiang Mai, Northern Thailand.
- 2.2. To identify opportunities, limitations, and recommendations in agrotourism in Chiang Mai, Northern Thailand.

3. Research Methodology

3.1 Samples

The sample group for this research consisted of the main informants, who were farmers who carried out agrotourism activities and tourism operators. The interviewees' agrotourism sites in Chiang Mai must be registered for at least a year with the Department of Agricultural Extension at 78 locations in 2016 or the Tourism Authority of Thailand at 14 locations in 2020, a total of 92 locations because these two agencies have a direct role in registering for agrotourism. The researcher collected data on agrotourism in Chiang Mai from a total of 25 districts without using random sampling. After verifying the database's basic information by telephone and traveling to the



actual location in order to obtain the study area that meets the objectives of the research, the researcher faced the COVID-19 situation and a storm in the north which caused severe damage to the agrotourism locations near mountains and rivers. Many roads were broken, and many agrotourism locations had stopped running or shut down, so only 74 agrotourism locations (N = 74) could take part in this study.

3.2 Research Instruments

According to the research objectives, the researcher created a semi-structured interview. The Reliability test had a Cronbach's Alpha value of 0.758 and passed the Ethics Review on Human research by the Human Research Ethics Committee, Chiang Mai University. The questionnaire with both closed-ended and open-ended questions for general information about agrotourism was the research instrument.

3.3 Data Collection

There are two types of research procedures, which are:

3.3.1 Gathering primary data through observations and interviews.

3.3.2 Collecting secondary data from reports, documents, and publications related to research, as well as information from government agencies (the Department of Agricultural Extension and the Tourism Authority of Thailand).

3.4 Data Analysis

3.4.1 Use descriptive statistics such as Percentage, Frequency, Mean, Minimum and Maximum to describe the context of tourist attractions.

3.4.2. Apply the agrotourism concept developed by Addinsall et al., (2017) to the research instruments, which is an interview form that covers all five RWSAE dimensions.

3.4.3. Analyze opportunities, limitations, and suggestions for implementing agrotourism activities by grouping and classifying the types of opportunities, limitations, and suggestions that farmers provided in open-ended questions into categories.

4. Research Results

4.1 The current state of agritourism in Chiang Mai, Northern Thailand; it was discovered that it was divided according to the nature of the owner and management. Most of them are a combination of farmers who are community enterprises at 91.9%, business owners 5.0%, cooperatives 2.7%, state enterprises 1.4% and Young Smart Farmer (YSF) 9.5%. The majority of tourist attractions are small (less than 20 rai), accounting for 62.2% of all attractions, followed by large (51 rai or more), accounting for 21.6%, and medium-sized (21–50 rai), accounting for 16.2%. In terms of the nature of the main activities, cultivation accounts for 27.0%, agricultural learning resources account for 17.6%, and tourism accounts for 17.6% followed by entrance fees, where 9.5% collect an admission fee and 70.3% do not charge an admission fee, most of them



did not have accommodation available (41.9%), followed by accommodations with a minimum of 301–500 baht per night (23%), there were more than 11 accommodations at 16.2%, 2-3 houses and 6-10 houses were the same at 12.2%, tents were provided at 33.8%, massage services were provided at 27%, tour bus services were provided at 36.5%, services for organizing meetings were provided at 37.5%, basic facilities, electricity, and water were provided at 97.3%, potable water was provided at 94.6%, there was a phone signal for all networks at 91.9%, there were toilets for the disabled at 6.8% , CCTV cameras (43.2%), security guards (33.8%), alarm systems (43.7%), and interpreters for foreign visitors (43.7%).

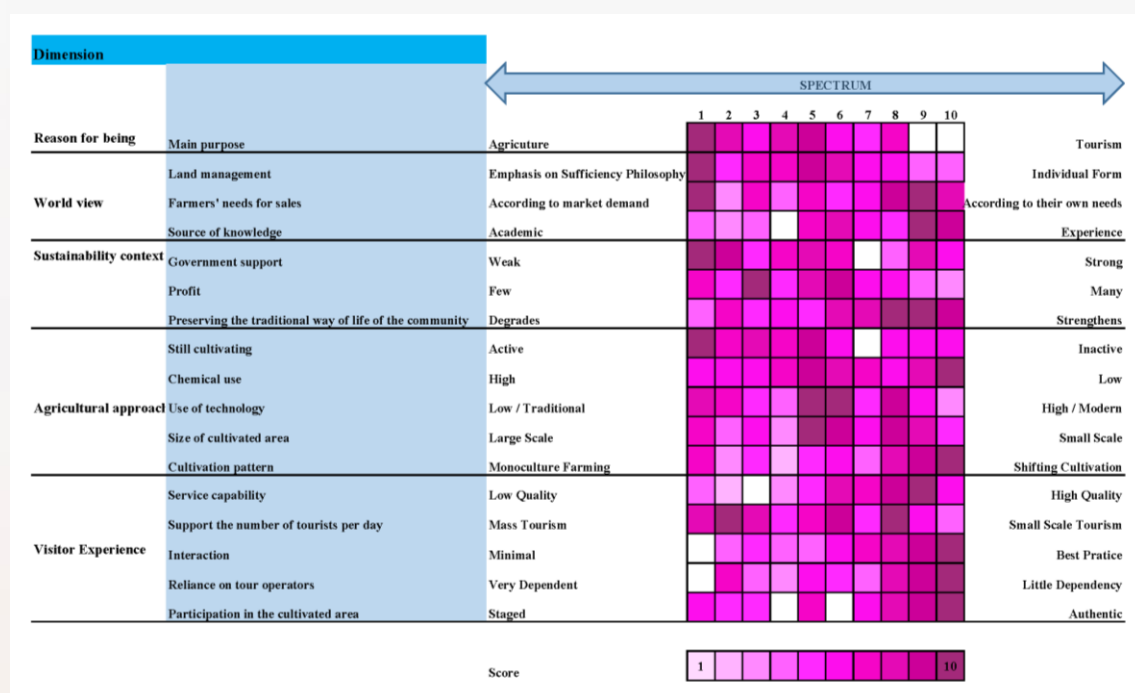


Figure 1. Shows the Five dimensions of the agrotourism concept (RWSAE) that has been adapted from (Addinsall et al., 2017).

4.2 The five dimensions of the agro-tourism concept (RWSAE) revealed that(Figure 1):

4.2.1 Reason for being: Agrotourism was established for its main purpose, which focused solely on agriculture, Spectrum 1 at 25.7%, followed by its main purpose for establishment, which focuses on agriculture and tourism simultaneously, Spectrum 5 at 17.0%.

4.2.2 World view: Agritourism in the form of land management emphasized the sufficiency philosophy that applies to oneself the most, Spectrum 1 at 31.1%, followed by the sufficiency philosophy and self-development, Spectrum 5 at 13.5%. As for the model of marketing or farmers' needs for sales, there is a model that depends on market demand and their own needs; Spectrum 1 and 9 are the same at 16.2%, followed by their own needs, Spectrum 8 at 14.9%,



and presentation style and source of knowledge, most of which come from the experience of Spectrum 9 at 25.7%, followed by Spectrum 10 at 17.6%.

4.2.3 Sustainability context: A study in the context of the continuity and survival of agricultural tourism revealed that, in terms of government support, there was still little support at Spectrum 1, at 37.8%, followed by Spectrum 2, at 13.5%. Spectrum 3 was in the lead in terms of profit at 20.3%, while Spectrum 6 was in the second place at 17.6%. As for promoting or preserving the traditional way of life of the community, there was a lot of emphasis on promoting or preserving the community way of life at Spectrum 8 and 9, both at 21.6%, followed by Spectrum 10 at 18.9%.

4.2.4 Agricultural Approach: The following agricultural practices are part of agrotourism: Current situation: Spectrum 1 is still cultivating and largely still opening at 62.2%, followed by Spectrum 5 with discrete openings at 14.9%, and Spectrum 3 with 6.8%. Chemical use: Spectrum 10 uses no chemicals at all, Spectrum 5 uses 10.8%, and Spectrum 6 uses some chemicals at 9.5%. Technology use is still lacking, not least because Spectrum 5 and Spectrum 6 both have 16.2%, with Spectrum 8 coming in second at 14.9%. Size of cultivated area: there is an area of cultivation that is not too small or too large, at Spectrum 5 and 6, equal at 16.2%, followed by a relatively small area at Spectrum 8 at 14.9%. Cultivation pattern: Most of them were mixed (shifting cultivation) at Spectrum 10 at 31.1%, followed by Spectrum 9 at 20.3%.

4.2.5 Visitor Experience: Studies in the context of visitor experience were as follows: Serviceability of providing high-quality services was at Spectrum 9 at 23.0%, followed by Spectrum 8 at 21.6%. That can be accommodated at Spectrum 2 and a small amount at Spectrum 8 at 16.2%. (Interaction) was at Spectrum 10 at 31.1%, Spectrum 9 at 29.7% and Spectrum 8 at 14.9%. They were still less dependent on tour operators in terms of travel advertising, with Spectrum 10 at 37.8%, Spectrum 9 at 17.6% and Spectrum 8, at 14.9%, mostly allows visitors. It contributed to the actual setting in the crop area Spectrum 10 at 45.9%, followed by Spectrum 9 at 23.0% and Spectrum 8 at 12.2%.

5. Discussion

The following points were addressed according to the research findings:

5.1 Agrotourism context in Chiang Mai, Northern Thailand, and current conditions:

The farms were quite small, no more than 20 Rai, and more suitable for agricultural tourism because small farms were more profitable than large agrotourism sites. The small agrotourism sites were not collecting admission fees, including affordable accommodation costs. The minimum per night was 301–500 baht, and there were a sufficient number of accommodations, the availability of infrastructure, electricity, and drinking water, a phone signal for all networks, a free internet contract, the ability to accommodate foreign tourists, and an interpreter that can create satisfaction for tourists as well. However, there were still a small number of agricultural tourism sites that focused on activities with accommodations or tents available, massage services, tour buses available at meeting services, a disabled bathroom, a closed-circuit camera, a security guard, and an alarm system. According to Trung and Simaraks, (2020), agrotourism has



the potential to attract high-quality tourists while also improving the level of experience, engagement, and meeting the needs of tourists who visit the destination. But on the other hand, if the tourist area attracts fewer tourists, the chances of making money are also reduced Bhatta and Ohe, (2020).

5.2 Limitations, opportunities, and recommendations for agrotourism.

5.2.1 Limitations:

Due to a lack of standardized and international agrotourism management knowledge, as well as agriculturist attitudes and cultural characteristics, there will be limitations in providing services and meeting the needs of tourists when agrotourism is developed.

Presenting the Sufficiency Philosophy (applied to oneself) and presentation style (knowledge) are acquired through one's own experiences, resulting in a lack of awareness and new information that makes it impossible to acquire or improve necessary skills. It could also make people less likely to start new agrotourism projects, which could have an effect on the quality of the products.

Lack of continuity, low profits, and lack of government support have resulted in a reduced ability to distribute products, a deteriorated financial position, and a reduced ability to provide basic facilities.

Lack of communication with target tourists and tour operators due to limited links with the tourism sector. As a result, the market opportunities for agrotourism are also limited, resulting in limited agrotourism activities. which is consistent with the research about the challenges or limitations of agrotourism shown in Figure 2. by Rambodagedara, et al., (2015).

5.2.2 Opportunities:

Most of them are increasingly adopting integrated farming by converting to 100 percent chemical-free agriculture, still lacking the use of





technology in farming. However, because they lack the courage to initiate creative ventures. They therefore need guidance, direction, and awareness. which must be obtained from an educational institution or government If agri-tourism receives support, advice or technology to help solve the problem It will be a valuable learning resource for people in that community or other tourist destinations that face the same problem. It will also meet the needs of tourists who want to learn about agricultural management. rural economy and agro-tourism, Tseng et al., (2019).

Figure 2. Shows the results obtained by applying the concept Addinsall et al., 2017 together with the key challenges of Rambodagedara et al., (2015).

5.2.3 Recommendations:

To increase service potential and the impression level of tourist attractions and services, relevant agencies should conduct a study, market research, survey, or collect additional agrotourism market information. The tourism network should be developed as a marketing activity with associated parties through the shared use of community resources or to encourage participation in the development of agrotourism activities through the efficient and effective use of resources. Kruntakapakorn et al., (2020).

Based on the findings made in the field during the research process. The researcher observed that the majority of agrotourism destinations lack interconnection, and some are monocultures, resulting in a lack of variety of activities and the balance between the agricultural sector and the tourism sector, such as flower garden attractions that require effective management. There is a risk that if tourists do not visit during the blooming season, there will be a loss of income from cutting fresh flowers for sale, as these flowers are kept for tourists to view.

Evidently, agrotourism destinations must rely on effective communication, such as convenient travel times, etc. Which constraints, opportunities, and recommendations will be essential to the development of agrotourism in the face of high inflation and climate change, which necessitate planning for agriculture that can generate more income, requires little space, and is profitable.

The concept of beginning with agriculture alone must be learned and modified to meet agrotourism standards. Good services, knowledge, and new forms of agrotourism should be studied in order to improve product quality and standards. The integration or alignment of the network should be able to fulfill something that they lack but that network members have, which will be able to meet the needs of basic facilities to a certain extent.

6. Conclusion

From a context study to identify opportunities, limitations, and recommendations for agrotourism in Chiang Mai, Northern Thailand. It can be concluded that in the context of Northern Thailand: Agrotourism is not too large and is appropriate to attract a small number of tourists. It is suitable for families to learn and participate in unique and diverse activities within a day, and it is not expensive to visit. But it is important that the continuity and survival of



agrotourism are vital to preserving the traditional way of life of the community, consistent with Bhatta and Ohe, (2020) belief that people should be connected to and integrated into the local tourism industry.

Agrotourism will have market opportunities when basic needs are met and when young people return to their hometowns to turn family farmland into a tourist destination. Particularly during the outbreak of COVID-19 and travel in the next normal era is challenging.

However, there are limitations in terms of support, a lack of knowledge in managing agrotourism, providing services, and meeting the needs of tourists, as well as a lack of new information. As a result, it is impossible to acquire or improve the necessary skills, which may discourage the establishment of new agrotourism initiatives or attractions, reduce the quality and standard of goods and services, and restrict activities within agrotourism that generates income. In addition, there are limitations regarding continuity, technology, and communication with target tourists and tour operators

7. Recommendations

7.1 Agrotourism operators and agricultural community enterprises should assess two things:

7.1.1 Assess self-attractions to identify flaws and find a network that is on the same path to building strength in the post-COVID-19 era and should share the benefits back to the community to reduce the risk that may arise from resistance within the community.

7.1.2 Evaluate tourist groups or consumer trends in tourism, whether it is an aging society, more Gen-M (Millennial Generation) people, or smaller families (Armer et al., 2015).

7.2 The Department of Tourism, the Ministry of Tourism and Sports, the Tourism Authority of Thailand (TAT), and relevant agencies should assess the potential of agrotourism in order to classify it as having high, medium, or low potential in order to determine its direction and action. Guidelines for the development of agrotourism to suit each organization that is involved in agrotourism in the future.

7.3 The Department of Agricultural Extension is the agency that establishes agrotourism policies; consequently, it is necessary to follow up and thoroughly evaluate the developed guidelines to reduce risk, and best practices should be established, particularly for agrotourism at an early stage. Bhatta and Ohe, (2020).

7.4 Educational institutions should provide knowledge, personal development, training, technology, or innovations that will help in agriculture or various services in agrotourism and at the same time encourage students who need internships to learn more knowledge and wisdom in agriculture.

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A Case Study Measuring Entrepreneurship Programming on Incubator Leadership, Mentorship and their Impact on the Success Rate of Incubator Clients

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Abstract

Food and beverage entrepreneurs are faced with similar challenges to scale as other industries however with unique differences. The purpose of this study is to evaluate the critical factors that influence and contribute to incubator clients advancing to an accelerator facility or exit to private commercial space. Leadership and mentorship are analyzed to ascertain their impact on client success and their overall importance in managing these valued centers. The main research problem considers the many challenges start-ups face that can affect their chances of survival including limited access to financial resources, recruiting skilled labor and a lack of experience on how to seize certain opportunities.

The researcher designed a quantitative survey tool to address four key areas; leadership skills, facilities, demographics and a brief qualitative short answer section. The survey was emailed to several Canadian incubators as well as three incubators in the United States and generated a survey return rate of more than 80%. The data generated from the completed surveys, comprising 21 questions, were manually coded and transferred into SPSS software for analysis. The data was run to generate Cronbach Alpha reliability statistics, various descriptives including Pearson correlations and a one-way ANOVA for analysis and interpretation.

The survey results confirmed that leadership does contribute to incubator client's success and positively impacts their progress to a more advanced business status. As well, both educational programming and responsible facility protocols were also identified as meaningful factors. There were a few key findings in this study and can be summarized as follows:

- Strong and decisive leadership impact the success of incubator clients,

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- Mentorship services contribute measurably to the positive development of incubators,
- Training and educational courses are important for incubator development and advancement,
- Certified and good quality commercial grade equipment is very important at incubator facilities, and
- Connecting incubator clients with business opportunities and raising capital contribute to the overall success of incubators.



Introduction

A food and beverage incubator center is a licensed shared-use commercial kitchen facility that is generally certified for food production activities. Both small and mid-sized businesses are attracted to incubators due to the factors noted earlier. These companies also thirst for leadership, mentorship, training and the opportunity to scale their enterprise. When the latter is achieved, incubator leadership at some incubator centers may introduce investors or lenders who can invest needed capital to expand the company into a viable and prosperous enterprise.

According to the U.S. Kitchen Incubators, since 2013, food and beverage incubators have grown from 135 to more than 600 across 48 states in 2019 (U.S. Kitchen Incubators, An industry update, January 2020). This growing expansion contributes to the food and beverage sector being one of the most dynamic manufacturing sectors and an important contributor to the economy.

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These aspiring entrepreneurs, who are challenged to invest in capital equipment and training, rely on these centers to provide mentorship and educational programming to assist in enhancing Major Research Project product development and food processing activities that will make them market-ready and sustainable.

According to Statista, the food and beverage and tobacco products sector ranked third, only behind computer and electronic products and chemical products with a total of \$273.5 billion as a value-added contributor towards Gross Domestic Product (GDP) by manufacturing sector in the United States (2020). As a result, this sector is a critical employer in the restaurant and hospitality sector. The U.S. Bureau of Labor Statistics reports that there were 11.54 million persons employed in food services and drinking establishments as of March 2022 (U.S. Bureau of Labor Statistics, 2022).

Strong leadership and mentorship coaching play an integral role in the development of new clients in incubators. The role they play is to help shape these companies for future successes. The most productive centers are those which have strategic relationships with a variety of stakeholders. This creates an ecosystem whereby collaboration and innovation are supported by all parties. As soon as an incubator client achieves success, they exit to an Major Research Project independent commercial space or move into an accelerator which has more advanced programming and operating structure.

Keywords: incubator, accelerator, innovation, leadership, mentorship, collaboration.

Statement of Problem

Start-ups face several challenges that can affect their chances of survival including limited access to financial resources, a lack of initial team experience, challenges in recruiting skilled labor and a limited knowledge and experience on how to seize certain opportunities. There is not a consistent approach to training



incubator clients which in the end has varying degrees of successes and outcomes. The primary objective of a food and beverage incubator is to assist aspiring entrepreneurs achieve excellence and success with their business venture. Gnyawali and Fogel (1994) state that the possibility of creating a successful new business increases substantially when the potential entrepreneur does not face significant market-entry barriers and has the knowledge necessary to start a business. This research study will consider these factors and review the importance of leadership and mentorship on the success of incubator clients. The survey instrument developed will also review education and training programming and the integrity of the commercial equipment and facility where they operate Major Research Project.

Rationale

There is a need to study this problem because there is no universal incubator performance evaluation system allowing for benchmarks and conclusions to be drawn. Small businesses account for a significant segment of the workforce in most countries and jurisdictions and incubators contribute to the evolution of many small enterprises. According to the Government of Canada, Key Small Business Statistics 2021, a small business has 1 to 99 paid employees, a medium business has 100 to 499 paid employees and a large business has 500 or more paid employees (p. 6, 2021). Initially, this research will identify and summarize the key markers that impact the operation of an incubator. In particular, the research closely examines leadership and mentorship and how a strong and decisive incubator manager can impact new incubator clients to become viable and successful. An incubator's available programming options and the quality of the facility operating standards are also integral in elevating an incubator's success rate.

This research will then review the critical factors that contribute to incubator clients advancing to the next stage of their development to either an accelerator or exit the incubator into commercial production space. A close examination of leadership and mentorship will be studied to evaluate the impacts it has on incubator client success.

Research Questions and corresponding Hypothesis

1. How leadership skills impact the success rate of incubator clients in advancing to an accelerator based on years of experience, age and education.

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Dependent variable: success rate of incubator clients

Independent variables: number of years' experience, age and education.

Null Hypothesis: Leadership skills have no impact on the success rate of incubator clients based on years of experience, age and higher education.



Alternative Hypothesis: Leadership skills do have an impact on the success rate of incubated clients based on number of years of experience, age and higher education.

2. To what extent is there a significant relationship between leadership skills and mentorship based on a facility's operational excellence and the incubator's ability to raise capital.

Dependent variable: Leadership skills and mentorship.

Independent variables: Facility excellence and ability to raise capital.

Null Hypothesis: Leadership skills and mentorship services have no impact on the success rate of incubator clients based on a facility's operational excellence and ability to raise capital.

Alternative Hypothesis: Leadership skills and mentorship services have an impact on the success rate of incubator clients based on a facility's operational excellence and ability to raise capital.

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Definition of key terms

Keywords: incubators, accelerators, leadership, innovation, collaboration, mentorship,

- An incubator is a workspace in a facility developed to provide startups and new ventures access to resources they require to operate their business at a singular location. Incubators provide necessary resources allowing companies to access industry mentors, interface with other entrepreneurs and as they progress and gain traction, connect with capital to expand their footprint and business horizons.
- An accelerator, also known as seed accelerators or start-up accelerators, are centers that advance the business creation process, launch products, increase start-up survival rates and assist in sourcing early-stage investments (Cohen et al., 2019)
- Leadership is the ability of an individual or a group of individuals to influence and guide followers or other members of an organization. Leadership is also a process of social influence, which maximizes the efforts of others, towards the achievement of a goal.
- Innovation refers to something new or to a change made to an existing product, idea, or field.
- Collaboration occurs when individuals work together for a common purpose to achieve a common business benefit.

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- Mentorship includes the influence, guidance, or direction provided by a mentor. A mentor is someone who teaches or provides help and advice to a less experienced and often younger person.



Assumptions

An important assumption made by the researcher is that the designated person selected to participate in the survey exercise completed all questions in an honest manner and did not have any biases. It is further assumed that the incubators chosen for this survey process provide accurate reporting and meet the required threshold to conduct their operation as an incubator enterprise to effectively deliver the necessary services in this regard. The researcher has a high degree of confidence that these requirements have been achieved based on existing relationships with the centers and leadership.

Limitations

There are definitely a few limitations related to this study. The first limitation is how the questions were asked in the survey. While the questions were concise, there is always the concern about how people interpret a question's intent. A second limitation relates to age and how younger participants view the importance of leadership and mentorship. Finally, it cannot be ascertained the level of technical and programming training staff possess. There were some interesting dynamics that will be reported in the conclusion section at the end of the report.

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Without question, COVID-19 impacted how incubators conducted business as there were restrictions on access to premises and physical interaction with staff. The researcher was consistently told by incubator leadership that direct interaction with incubator clients was integral during the initial period of integration and adjustment. As well, stricter measures to clean equipment and supply chain issues was also a factor and limitation.

Literature Review

Introduction

Food and beverage incubators support food processing and catering enterprises at an early stage before they need access to full-time production facilities. These centers are small-scale food processing facilities and include a range of processing equipment and storage facilities, often designed and managed in compliance with hygiene and safety requirements. In addition, an incubator often provides advisory support, either directly or through external partners.

In the following section, critical literature will be referenced and reviewed to provide the foundation for better understanding leadership and its impact on improving a food and beverage incubator's success. A brief overview of important concepts and literature relevant to leadership as well as key pedagogical approaches will be considered. It is important to understand that leadership has many interpretations; however, according to Kouzes and Posner (2016) leadership has often been referred to as a set of traits, styles, personality types or strengths (p. 49). Incubator managers are the stewards of the organization and are responsible for implementing

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programming, hiring staff and interfacing with aspiring entrepreneurs in the early stage of their entrepreneurial journey. A stable and thoughtful leader can make the difference in determining whether the incubator enterprise is successful.

Many thought leaders including Adelman (1992) have credited the origins of leadership to the work of Dr. Kurt Lewin who founded action research while developing concepts around social psychology (p. 7). Action research permitted him and his distinguished research team to apply their psychological ideas to a practical situation (p. 9). It is imperative that modern leaders balance competing interests when dealing with new business clients who often do not possess the skill or business acumen to make business decisions. The work advanced by Cartwright & Zander (1953) regarding action research supports this proposition as this is the means of systematic enquiry the researchers note, for all participants, in the quest for greater effectiveness through democratic participation.

Education and Training

While incubators are centers for business development, they are also a place of learning where incubator clients achieve educational milestones. A proper balance of training and mentorship can favorably impact the success of aspiring companies seeking to gain product validation and business independence. Stal et al. (2016) noted that in the 1990s, academic entrepreneurship expanded, and this has resulted in another increase of incubator programs on university campuses. This has created a strong dynamic between institutional and private stakeholders and as a result, new synergies and creativity has been an outcome. A clear Major Research Project outcome, according to Green and Venkatachalam (2005), is that over the last thirty years, as the United States converted to a knowledge-based economy, university partnerships with industry increased and resulted in the opening of even more business incubators. This expansion has not been focused in one sector only as we've experienced growth in varying industries including the automotive and technology sectors for instance.

According to Piterou and Birch (2014), university incubators are one way in which academia can connect with corporations. The incubators create a networking base for the university and provide links between the entities Piterou and Birch further add. Bikse et al. note that entrepreneurial universities are important to prepare business and non-business students to “respond entrepreneurially to societal challenges,” and there is a need to help students build “cooperation networks” to face these challenges (2016, p. 75). Bank and Kanda (2016) proclaimed that University incubators now exist all over the world.

In October 2015, the School of Hotel Administration at Cornell University held a forum to discuss impacts of food and beverage incubators on the agri economy. According to Olsen and Stanley (2016), food incubators can help shape leadership for many enterprises as the dynamics are evolving at different levels. One of the industry participants commented: “Beverage entrepreneurs are faced with significant challenges, including increased government oversight with the Food Safety Modernization Act and over saturation of new product offerings”. Bringing a new product to market is tough. However, there are incubators available to help with the facilitation of the process and idea. Incremental scaled production is another approach to building a business (p. 8). This noteworthy comment may provide an interesting opportunity for Major Research Project



incubator leadership and a call to action to expand their relationships with universities and colleges due to their well established connections with industry and governmental agencies.

With the advent of globalization, it is now easier to access a wider range of commercial products and introduce technological advances more readily. The ability to share ideas has also expanded exponentially through new mediums such as Zoom, Teams and related products which have been the primary forums due to COVID-19.

Many business enterprises and sectors have had to fundamentally change the direction of how they were conducting business as their current products or services were not meeting the needs of the market. An interesting parallel has taken place in global travel and tourism, which directly impacts food and beverage, as rapid technological changes, and exacerbated by COVID-19, have altered the future of work in a dramatic fashion. Dredge et al. (2019) note that maintaining market share fuelled by rapid technological advancements, the fourth industrial revolution (i.e., Industry 4.0) has led to deep transformations in the travel sector, from the rise of online sharing platforms (e.g. Airbnb and Uber), the replacement of traditional travel agencies with online tourism supply chains (e.g., Booking and Expedia), to increased automation in aviation, accommodation, food and beverage services (2019).

Importance of Leadership

According to Lynde (2020), the principal objective in building a new food system is to support long-term changes that will have far-reaching benefits across all sectors of the food chain. This approach Lynde adds, will move you away from trends toward true transformation. Major Research Project This direction requires support, commitment, and intentional leadership from a diverse range of stakeholders including academic researchers, investors, consumers, industry leaders, and big and small businesses. Lynde maintains that the entrepreneurs can drive the system's evolution by designing their innovations to consider their impact on the entire system including potential economic shifts, global finance, individual health, education, and beyond (p. 3).

Jansson, M. (2021) recently completed a major study based on an electronic survey posted on LinkedIn and Facebook, wherein he noted "that the strongest predictor of innovative work behavior included individual grit, organizational culture, and R&D in job description." Jansson further stated that the "relationship between the leader and the follower was a weaker predictor of innovative work behavior than organizational culture." The study did reveal that innovation remains integral to maintain market share and relevance in the industry. A number of major companies including the likes of Kodak and Nokia points out Jansson (2021), failed to respond to market changes in technology and suffered major business disruptions and market share.

According to Palkova and Palko (2017), food incubators are engines of change and possess the unique ability to promote productive, inclusive and sustainable economic development. The researchers further noted that they provide a strong foundation for the creation and expansion of food businesses and jobs by helping communities, development agencies to revitalize underutilized



buildings into food sector learning, innovation and production. Palkova and Palko's study focussed on four countries in the European Union and established that learning Major Research Project

and strategic structure are key factors to develop food kitchens and incubators which ultimately support enterprise and training which will stimulate food economies.

Although leadership has been defined as a personal quality, Silva (2016) notes, following World War II, Stogdill (1950) defined leadership as "the process (act) of influencing the activities of an organized group in its efforts toward goal setting and goal achievement". Silva posits that this was possibly the first effort to point out that leadership was not a mere individual trait but a process of influence upon others. Stogdill further asserts the purpose of that process is "goal setting and goal achievement."

Overview of Incubators

According to Dent (2008), business incubators provide workspace, usually at below market rates, and support for entrepreneurs through business management, financial and technical advice (p. 497). These support services are integral and are augmented by mentorship support services as well as an incubator's ability to raise capital for its clients. According to Palkova and Horská (2016), entrepreneurs who need licensed commercial kitchens do not have enough capital to invest in their own commercial kitchen and cannot develop their full potential (p. 489). These kitchen incubators and shared use kitchens seek to fill a gap and provide facilities for these entrepreneurs at an early stage of their development. An incubator center that can bring in investors with capital and business expertise are often essential to ensuring that these young companies will survive and thrive in the future. While there are many types of entrepreneurial centers, Piterou and Birch (2014) have identified them into four types of centers: (a) publicly

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funded business innovation centers, (b) university business incubators, (c) independent private incubators focused on growth, and (d) corporate private incubators.

Government Funding

The role of government funding in supporting economic development initiatives cannot be understated. The role of government in part is to assist business ventures achieve success, which in the end results in economic activity that benefits several groups in society. Incubators in large measure rely on government grants and incentives in the beginning to find an economic equilibrium point. According to Reynolds et al. (1999), entrepreneurship has long been considered a primary driver of economic growth in society, with one study finding that nearly 70 % of economic growth in the United States can be attributed to entrepreneurial activity.

According to Canovas-Saiz et al. (2021), there is a growing stream of research into entrepreneurial ecosystems (EEs) which examines the roles that



some key actors and networks play in effectively promoting the emergence and growth of new companies in given geographical areas. This reality is consistent with agglomeration economics which asserts that related industries will flourish when they are clustered together which creates efficiencies and favorable dynamics for those enterprises in this ecosystem. A few years earlier Fang et al. (2015) affirmed that an entrepreneurial ecosystem is typically characterized by being based on innovation, being aimed primarily at driving development, and at growing regional economies. Canovas-Saiz et al., assert that start-ups become essential actors in these ecosystems and intersect many stakeholders that support a regional economy (p. 4). Major Research Project One significant operational challenge that incubators face is that their programs require time and substantial funding to maintain. Canovas-Saiz et al., suggest that entrepreneurs need help to develop and turn their ideas into reality, and while various entities, such as governments, universities and investors promote the development of new companies, there is no complete support system to nurture companies in their early stages (p. 18). Future research must consider how these important incubator enterprises can remain relevant as their value in the entrepreneurial ecosystem is meaningful. Perhaps understanding the critical factors that contribute to client success can shed important information in this regard.

Methodology

The researcher has meaningful experience in dealing with incubator centers having visited and collaborated on various initiatives. The activities included various meetings, virtual and in person, to discuss best food and beverage practices and collaborating and partnering on a number of food and beverage initiatives. The researcher has hosted food summits with various levels of government including U.S. partners who have participated to discuss educational programs and best practices at incubator centers and educational institutions. In addition, the researcher has partnered on a number of food and beverage symposiums with private, public and educational stakeholders participating in these events. Industry experts from various sectors participated as well as small businesses and students attended these events. The researcher also Major Research Project hosted a virtual food and beverage event during COVID-19 with an international audience over a three day period.

The researcher reached out to a number of incubators, both private and public, to participate in the survey focusing on effective incubator entrepreneurship programming for incubator leadership and mentorship. The quantitative survey tool was designed to address four key areas; leadership skills, facilities, demographics and a brief qualitative short answer section. The survey was emailed to several Canadian incubators in Ontario, one in Alberta and three incubators in the United States. There was a survey return rate of more than 80% achieved. The survey comprised 21 questions with two being qualitative in nature to ascertain personal reflections and feedback from the respondents. The data generated from the completed surveys, excluding the last two questions, were transferred from the Google form into an excel sheet and the answers were manually coded and transferred into SPSS for analysis. Using SPSS software, the data was run to generate descriptive including Pearson correlations and a one-



way ANOVA were run. A reliability analysis was also completed to ensure that the scale yields were consistent and the results were reliable.

Sample

The researcher selected a total of 21 incubator centers from various jurisdictions with the concentration being in the Greater Toronto area (GTA), six outside the GTA and three based out of Western New York. The six centers outside of Toronto including Fanshawe College's Centre for Research and Innovation (CRI) in London, Ontario, Conestoga College Food Services in Major Research Project Kitchener, Loyalist College Food Incubator in Belleville, Niagara College Ontario Canadian Food and Wine Institute, Ontario Agri-Food Venture Centre (OAFVC) and Leduc Food Processing Development Centre (LFPDC), Alberta. The researcher has communicated with all of these enterprises and visited a number of their locations. With a few incubator centers, the researcher partnered and promoted an educational food and beverage symposium including small businesses, government officials, educational institutions and students.

Instrument

The researcher deployed interviews with a number of incubators in the research as there is an established relationship. The researcher did not discuss any questions or share the research questions to be deployed. As this research is focused on measuring the impacts of leadership and mentorship on incubator clients, a commercially viable instrument was not readily available. At a number of incubator locations, the researcher has previously visited these centers. The primary instrument to be used in the research is a survey developed by the researcher. A focus group and course professor, Dr. Sushma Marwaha, was contacted to ensure that the instruments were valid and appropriate.

The survey tool developed contained four distinct sections as follows:

- Section 1: Leadership Skills
- Section 2: Facilities
- Section 3: Demographics
- Major Research Project

Section 4: Short Answers

The primary instrument supported the two main research questions and associated hypotheses effectively and the results obtained were appropriate. As noted, the communication with the incubator centers did not discuss the survey instrument and was strictly to receive permission to forward said survey for participation in the research exercise.

Findings

Following completion of the survey, a reliability analysis was tabulated using SPSS in order to calculate a Cronbach Alpha. The researcher ran three separate reliability scenarios and generated varying and interesting results. In order to achieve validity, the researcher relied on a focus group to validate the survey questions and finalize the survey. The field expert was the researchers professor, Dr. Sushma Marwaha who oversaw the project and study.



In order to ascertain reliability in key areas, the researcher ran three reliability tests including one for the total sample and a separate analysis for Leadership Skills and Facilities. The Cronbach Alpha produced a reliability of 0.630 for the aggregate of all variables, including both Leadership Skills and Facilities totaling 13, which is considered strong and reliable. From a population sample of twenty-one incubator enterprises, there were seventeen responses included as variables in the final analysis.

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A reliability score of 0.745 was achieved in the Leadership Skills section which is considered a strong relationship. This section has a greater impact on the research question and accordingly, contributes measurably to the overall study.

A reliability score of 0.469 was achieved when testing the facilities related questions which is acceptable for this study. It would be useful to explore additional research in this area and understand the incubators selection of equipment choice for their enterprise for instance, and optimal working knowledge of said commercial equipment. Was there a limited budget for commercial and was an analysis completed to address market demand in equipment selection should be considered? The work experience in the field and knowledge of commercially viable equipment needs to be considered as well.

Reliability

Scale: ALL VARIABLES

Case Processing Summary			
		N	%
Cases	Valid	17	100.0
	Excluded ^a	0	.0
	Total	17	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics	
Cronbach's Alpha	N of Items
.630	13

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Reliability

Scale: ALL VARIABLES



Case Processing Summary			
		N	%
Cases	Valid	17	100.0
	Excluded ^a	0	.0
	Total	17	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics	
Cronbach's Alpha	N of Items
.745	8

Reliability
Scale: ALL VARIABLES

Case Processing Summary			
		N	%
Cases	Valid	17	100.0
	Excluded ^a	0	.0
	Total	17	100.0

a. Listwise deletion based on all variables in the procedure.

Major Research Project

Reliability Statistics	
Cronbach's Alpha	N of Items
.469	5

Reliability

Scale: ALL VARIABLES



Case Processing Summary			
		N	%
Cases	Valid	17	100.0
	Excluded ^a	0	.0
	Total	17	100.0

a. Listwise deletion based on all variables in the procedure.

The researcher ran a one-way Anova to look at the relationship between three variables. The researcher found a strong significance (0.013) between An incubator manager should have relevant training before they are placed in a leadership position and it is important to provide meaningful mentorship services for incubator clients. A strong significance was also registered at the same level of 0.013 between it is important to have strong leadership in managing an incubator and it is important to provide meaningful mentorship services for incubator clients. The researcher also confirmed a strong significance (0.014) between It is very important to have strong leadership in managing an incubator and for new and existing incubator clients, providing relevant training and educational courses are important for their success.

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ONEWAY L2 L4 BY L5
/MISSING ANALYSIS
/CRITERIA=CILEVEL(0.95).

Oneway

ANOVA					
		Sum of Squares	df	Mean Square	F
An Incubator Manager should have relevant training before they are placed in this position.	Between Groups	8.209	2	4.105	6.014
	Within Groups	9.556	14	.683	
	Total	17.765	16		
It is very important to have strong leadership in managing an incubator.	Between Groups	7.003	2	3.502	6.086
	Within Groups	8.056	14	.575	



	Total	15.059	16	
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ANOVA		
		Sig.
An Incubator Manager should have relevant training before they are placed in this position.	Between Groups	.013
	Within Groups	
	Total	
It is very important to have strong leadership in managing an incubator.	Between Groups	.013
	Within Groups	
	Total	

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ONEWAY L1 L4 BY L6
 /MISSING ANALYSIS
 /CRITERIA=CILEVEL(0.95).

Oneway

ANOVA					
		Sum of Squares	df	Mean Square	F
A strong and decisive Incubator Manager will impact whether new incubator clients become viable and successful.	Between Groups	3.696	2	1.848	1.185
	Within Groups	21.833	14	1.560	
	Total	25.529	16		
It is very important to have strong leadership in managing an incubator.	Between Groups	6.837	2	3.418	5.820
	Within Groups	8.222	14	.587	
	Total	15.059	16		

ANOVA		
		Sig.
A strong and decisive Incubator Manager will impact whether new incubator clients become viable and successful.	Between Groups	.335



	Within Groups	
	Total	
It is very important to have strong leadership in managing an incubator.	Between Groups	.014
	Within Groups	
	Total	

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The researcher ran a Pearson correlation in the research study to determine a statistical relationship involving a variety of variables. There was a significant relationship of (0.842) between a very strong correlation between decisive incubator manager impacting new clients to become viable and successful and it is important to provide meaningful mentorship services for incubator clients at the 0.01 level and deploying a 2-tailed test.

The researcher also confirmed a significant and strong relationship of 0.662 at the 0.01 level and deploying a 2-tailed test, between an incubator manager having relevant training prior to being placed in this position and it is very important to provide meaningful mentorship services for incubator clients.

A third Pearson correlation yielded a significant and strong relationship of 0.673 at the 0.01 level deploying a 2-tailed test between an incubator manager having strong leadership skills before they are placed in this capacity and it is very important to provide meaningful mentorship services for incubator clients.

The final Pearson correlation generated a significant and strong relationship of 0.776 at the 0.01 level deploying a 2-tailed test, between developing long term formal partnerships with a local university or college and it is necessary that an incubator facility meet all governmental safety standards.

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Correlations

VARIABLES=L1 L5

Descriptive Statistics			
	Mean	Std. Deviation	N
A strong and decisive Incubator Manager will impact whether new incubator clients become viable and successful.	3.71	1.263	17
It is very important to provide meaningful mentorship services for incubator clients.	4.18	1.286	17



Correlations			
		A strong and decisive Incubator Manager will impact whether new incubator clients become viable and successful.	It is very important to provide meaningful mentorship services for incubator clients.
A strong and decisive Incubator Manager will impact whether new incubator clients become viable and successful.	Pearson Correlation	1	.842**
	Sig. (2-tailed)		.000
	N	17	17
It is very important to provide meaningful mentorship services for incubator clients.	Pearson Correlation	.842**	1
	Sig. (2-tailed)	.000	
	N	17	17

** . Correlation is significant at the 0.01 level (2-tailed).

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Correlations

VARIABLES=L2 L5

Descriptive Statistics			
	Mean	Std. Deviation	N
An Incubator Manager should have relevant training before they are placed in this position.	3.88	1.054	17
It is very important to provide meaningful mentorship services for incubator clients.	4.18	1.286	17

Correlations			
		An Incubator Manager should have relevant training before they are placed in this position.	It is very important to provide meaningful mentorship services for incubator clients.
An Incubator Manager should have relevant training before they are placed in this position.	Pearson Correlation	1	.662**
	Sig. (2-tailed)		.004
	N	17	17
It is very important to provide meaningful mentorship services for incubator clients.	Pearson Correlation	.662**	1
	Sig. (2-tailed)	.004	
	N	17	17

** . Correlation is significant at the 0.01 level (2-tailed).

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Correlations

VARIABLES=L3 L5

Descriptive Statistics			
	Mean	Std. Deviation	N
An Incubator Manager should have strong leadership skills before they are placed in this position.	4.24	1.033	17
It is very important to provide meaningful mentorship services for incubator clients.	4.18	1.286	17

Correlations			
		An Incubator Manager should have strong leadership skills before they are placed in this position.	It is very important to provide meaningful mentorship services for incubator clients.
An Incubator Manager should have strong leadership skills before they are placed in this position.	Pearson Correlation	1	.673**
	Sig. (2-tailed)		.003
	N	17	17
It is very important to provide meaningful mentorship services for incubator clients.	Pearson Correlation	.673**	1
	Sig. (2-tailed)	.003	
	N	17	17

** . Correlation is significant at the 0.01 level (2-tailed).



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Correlations

VARIABLES=L9 L11

Descriptive Statistics			
	Mean	Std. Deviation	N
For long term survival and success of incubator centers, it is important to develop long term formal partnerships with a local University or College.	3.82	1.131	17
It is necessary that an incubator facility meet all governmental safety standards.	4.82	.393	17

Correlations			
		For long term survival and success of incubator centers, it is important to develop long term formal partnerships with a local University or College.	It is necessary that an incubator facility meet all governmental safety standards.
For long term survival and success of incubator centers, it is important to develop long term formal partnerships with a local University or College.	Pearson Correlation	1	-.074
	Sig. (2-tailed)		.776



	N	17	17
It is necessary that an incubator facility meet all governmental safety standards.	Pearson Correlation	-.074	1
	Sig. (2-tailed)	.776	
	N	17	17

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Discussion

The descriptive section generated some valued and important findings based on the various tests performed. The study’s focus supported the two main research questions including how leadership skills impact the success rate of incubator clients in advancing to an accelerator based on years of experience, age and education and secondly, to what extent is there a significant relationship between leadership skills and mentorship based on a facility’s operational excellence and an incubator’s ability to raise capital.

There were a number of important findings generated that provide the basis for future research. The Reliability scores confirmed a strong relationship between the critical variables. A reliability score of 0.745 was generated for the leadership skills variables and an overall reliability of 0.630 for all variables was generated for the aggregate of all variables utilized in the analysis.

A one-way ANOVA was run to determine correlations between leadership management skills and importance of mentorship services which was significant. The one-way ANOVA also generated a strong significance when existing incubator clients receive relevant training and educational courses for their success.

The researcher also utilized a Pearson correlation to ascertain if there was a significant and strong statistical connection between incubator manager training and supporting mentorship services for the incubator clients. The Pearson correlation confirmed a significant and strong relationship between long term formal partnerships with local university and college institutions and meeting all governmental safety standards.

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As was noted in the results section, the researcher relied on a focus group to validate the survey questions and ultimately finalize the survey. For this study, the researcher relied on its professor as the field expert, Dr. Sushma Marwaha who oversaw the project and study.

Conclusion

The main research problem explores the many challenges start-ups face that can affect their chances of survival, including limited access to financial resources, recruiting skilled labour and a lack of experience on how to seize certain opportunities. In addition, this study evaluated critical factors that



influence and contribute to incubator clients advancing to an accelerator facility or exiting to private commercial space.

This research study has confirmed the importance and contribution of strong leadership and mentorship services on incubator clients' success. The survey findings also reaffirmed the overall importance of the effective management of these valued centers and how we may duplicate the findings in educational settings that offer food and beverage programs.

The researcher has collaborated and partnered on a number of food and beverage symposiums with various governmental, educational and private sector partners and the outcomes support the importance of strong leadership and mentorship services as key drivers for the success of incubator clients. These symposiums included graduates from these incubator programs who spoke and confirmed the importance of strong leadership and value of mentorship services and educational programs which reinforces these valued services.

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The last two questions of the survey were open questions allowing the participants to share their views on how incubator centers can be improved. There was significant consistency on the value of leadership however the researcher noted that the older and more experienced food professionals in years supported stronger leaderships importance than younger participants. As well, younger participants seem to believe that education has more importance than more senior food leaders.

In conclusion, the researcher's study concluded that the **Null Hypothesis:** Leadership skills have no impact on the success rate of incubator clients based on years of experience, age and higher education was rejected and the **Alternative Hypothesis:** Leadership skills do have an impact on the success rate of incubated clients based on number of years of experience, age and higher education was accepted.

Future Research

Future research should focus on developing standardized practices and certifications to be able to operate an incubator facility. There is a reliance on receiving funding from both governmental bodies and private sector sources and the researcher recommends the establishment of a professional license or certification to qualify and gain status to become an incubator center. The establishment of an independent body may want to establish a ranking or Major Research Project rating for incubators to allow future clients a choice on selecting the optimal incubator. The approvals may be linked to gaining a municipality's zoning or building approvals with penalties if standards are not met.

Maintaining a superior facility that meets all governmental safety standards and employing responsible food safety measures are paramount for an incubator center's success. There needs to be strict criteria for an incubator's safety measures and protocols. A facility that does not meet these standards could be subjected to penalties and other punitive measures to ensure appropriate actions are taken.

In addition, research can expand on the importance of leadership and mentorship services to gain further insights into the needs of clients in very early



stages in particular. This can be achieved through more robust survey instruments and reporting.

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A Creative Work: Program music on “Kreta-Kran” Song for Pop Orchestra: First Time

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Abstract

The purpose of this qualitative research was to create work: program music on “Kreta-Kran” Song for Pop Orchestra. The researchers are inspired by the integration of social, cultural, artistic, western, and eastern music styles and can be said to have brought music, music culture, western and eastern music style to combine music cultures in the form of rhythm, melody, and musical harmony. After that, the combination of Thai music and Western music became more widespread. which the 20th century era is called “contemporary music”, which in this era, contemporary music by popularity will be composing contemporary music for an orchestra or a pop orchestra. Faculty of Music, Bangkokkthonburi university was a learning center for music and created professional musicians. Therefore, making each day to hear different melodies. whether it is the sound of folk music, the sound of rock music, the sound of Thai music and others sometimes results in a combination of sounds that make the original musical melody feel strange.

Therefore, the result of this study was found that in a creative work: on “Kreta-Kran.” Song for Pop Orchestra: “First Time”. The researcher used music structure in ternary form, where the introduction part and part “A” present the main melody of this movement, and part “B” was the development of melody and harmony. And finally, the return of part “A” combined with the coda part.

Keywords: Creative Work, Program music, Pop Orchestra

1. Introduction

The researchers were inspired by the integration of social, cultural, artistic, western, and eastern music styles and can said bring music, music culture, western and eastern music style to combine music cultures in form of rhythm, melody, and musical harmony (Cage, 1958). After that, the combination of Thai music and Western music became more widespread. which the 20th century era is called “contemporary music” (Pancharoen, 2008). Which in this era, contemporary music by popularity will be composing contemporary music for an orchestra or a pop orchestra.

Contemporary music can be said to be the development of musical melody in every era from the past to the present (Edwards, 2004). In this era, contemporary music is very popular. It is a contemporary song of an orchestra or a popular orchestra. The pop orchestra consists of stringed instruments,



woodwind instruments, brass instruments, and percussion instruments (Rhythm section).

Local songs are that have been inherited in the form of oral traditions. Used to sing and dance for fun and festivities. This will create a melody from words that can be easily remembered (Chomchewchan, 2012). Emphasis is placed on the perfect touch and rhythm. local songs are unique. It is a song that the villagers rely on listening to and remembering. Use hand clapping or instrumental accompaniment to a simple, notable singing and dancing rhythm that must include the vocals of the chorus have more fun in the form of folk songs (Pancharoen, 2009).

“Music make people and people build nations” is the philosophy of the Faculty of Music, Bangkokthonburi University established since the academic year 2011 until now (Roongruang, 2022). Which is the place where the researcher has been working because the Faculty of Music is like a source of music learning and creates professional musicians. Therefore, making each day to hear different melodies. whether it is the melodies of local music, melodies of rock music, sound of Thai music and others sometimes result in a mix of sounds that make it feel strange from the original music melodies.

The compositions for “Kreta-Kran” for pop orchestra involving local melodies composed by Thai composers are not yet extensively and from the characteristics of local songs mentioned above. As a result, the researcher is interested in presenting creative works in the form of compositions by bringing the sounds of melodies in musical attributes that used to occur in the Faculty of Music to interpret and create a new song.

The composition of the song this time will be program music with a length of about 23-25 minutes, using the title of the song: A Creative Work: Program music on “Kreta-Kran” song for pop orchestra. It is divided into 3 movement:

1. First movement “First Time”
2. Second movement “Time Zone”
3. Third movement “Music Time”

These compositions take the range and sound color to cover all ranges of sound as well as all music expressions. The researcher therefore chooses to use various types of musical instruments and there are approximately 13 people divided into

1. Rhythm section 4 people
2. Melodies section 9 people

2. Research Objective

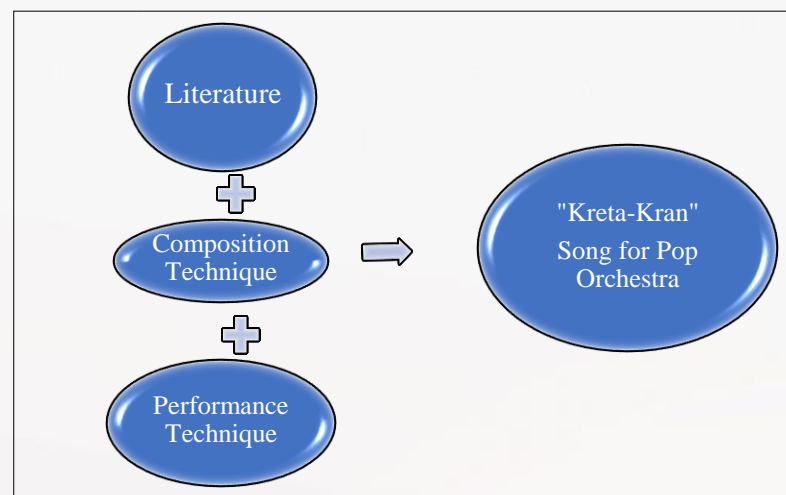
2.1 To create work: program music on “Kreta-Kran” Song for Pop Orchestra.

3. Research Methodology

A studied element of music in the composition program music on “Kreta-Kran song for pop orchestra” and published by the performance of works and creative research papers.



Figure 1
Concept framework



3.1 Data collection and creation work.

3.1.1 Studying the composition of music from documents, books, textbooks, interviews, and related research.

3.1.2 Interviewed with 3 experts of composition about the composition of each section of the music.

3.1.3 Consulting aspects of the problem in playing performance with pop orchestra composition with experts.

3.1.4 Composed songs and compositions by using advanced composition techniques.

3.1.5 Practice songs, compositions, and take notes on the performance of the music performers.

3.1.6 Take the recorded information, consult with experts, and exchange ideas with experts of music composition.

3.1.7 Published by the performance of works and creative research papers.

3.1.8 Collecting data and summarized results.

4. Research Results

The results were presented according to the research objectives as follows:

4.1 The overview of "Kreta-Kran." song for pop orchestra: First Time



Figure 2 Introduction of first movement "First Time"

FIRST TIME
KEETA-KRIN FOR POP ORCHESTRA

DE TATNUN CHODSANGJANA 2023

CONFUSED $\text{♩} = 100$

ALTO SAXOPHONE
TENOR SAXOPHONE
SMITHONE SAXOPHONE
TRUMPET IN B♭ 1
TRUMPET IN B♭ 2
TROMBONE 1
TROMBONE 2
VIOLIN 1
VIOLIN 2
PIANO
ELECTRIC GUITAR
4-STRING BASS GUITAR

CONFUSED $\text{♩} = 100$

2
DRUM SET
ALTO SAX.
TEN. SAX.
BAR. SAX.
TRP.
TRP.
TEN.
TEN.
VLN. 1
VLN. 2
PNO.
E. GTR.
BASS
DR.



Figure 3
Part A: The theme of first movement "First Time"

The musical score for Part A of the first movement "First Time" is presented for a full orchestra and vocal soloists. The score spans measures 24 to 33. The vocal parts (Alto, Tenor, and Soprano) are marked *mf* and feature melodic lines with some rests. The instrumental parts include Trumpets (Tpt.), Trombones (Tbn.), Violins (Vln. 1 and 2), Viola (Vla.), Cello (Cello), Double Bass (Cb.), Piano (Pno.), Electric Guitar (E. Gtr.), and Drums (Dr.). The piano part includes chord markings such as E⁷, A⁷, D⁷, and E⁷. The electric guitar part features a rhythmic pattern with a "bend" instruction. The drums play a consistent rhythmic accompaniment. The score is marked with a box 'A' at the beginning of measure 24.

Figure 4
Part B: The development of first movement "First Time"



Musical score for Part A' of the first movement "First Time". The score includes staves for Alto Saxophone, Tenor Saxophone, Bass Saxophone, Trumpet 1, Trumpet 2, Trombone 1, Trombone 2, Violin 1, Violin 2, Piano, Electric Guitar, Bass, and Drums. The score spans measures 68 to 76. Dynamics include *mp* and *mf*.

Figure 5
Part A': The rounded and coda of first movement "First Time"

Musical score for measures 129-135 of the first movement "First Time". The score includes staves for Alto Saxophone, Tenor Saxophone, Bass Saxophone, Trumpet 1, Trumpet 2, Trombone 1, Trombone 2, Violin 1, Violin 2, Piano, Electric Guitar, Bass, and Drums. Dynamics include *mp* and *mf*. Chord symbols are provided for the piano part: D7, E7, D7, E7, and A7.

4.2 Music structure of "Kreta-Kran." song for pop orchestra: First Time



In this article, the researcher chooses only the first movement: “First Time” of “Kreta-Kran song for pop orchestra”, as an example to interpretation as follows:

1. The inspired of music composition
2. The concepts of sound arrangement composition.
3. The concepts of the development of melody compositions.
4. The concepts of music structure, rhythm, sound intensity.
- 4.2.1 The inspired of music composition.

The researcher had inspired of music composition from the philosophy of the faculty of music, Bangkokthonburi University that “Music make people and People build nations”. This place is like a music learning center and establish professional musicians, therefore making each day to hear the sound of different melodies. whether it is the melodies of local music, melodies of rock, sound of Thai music and other melodies sometimes result in a sound that is mixed until it feels strange from the original musical melody. Therefore, the researcher hopes the listener to experience the atmosphere of the reverberating melody. It is also likened to the audience exploring the source of the melody in this place.

4.2.2 The concepts of sound arrangement composition.

According to the inspired of music composition, the researchers composed sound arrangement of first movement form a focus on Dominant chords so let the audience hear familiar melodic, most melodies have dominant chords. Therefore, the researchers chose a minor key in Part A to create the turbidity of melody and move it to major key in Part B. This is a relative key to show more and more and more clearly. And then, researchers used uncomplicated chord progression to makes it easier for the audience to understand the songs in chords progression I-I-IV-V and I-vi-IV-V.

Figure 6
Chord progression I-I-IV-V and Minor key



4.2.3 The concepts of the development of melody compositions.

“Kreta-Kran” song for pop orchestra: First Time, the researcher used a music structure in Ternary form (Three part form, ABA form), which is the structure of the song with three important parts, namely part 1 and part 3, which is the part “A” and part 2 is part “B”, which is part showing the development of the



main melody (Theme) of part 1 “First Time”. The researcher used important composition techniques to develop the main melody more complex until becoming an important main melody of part B, so the researcher chooses to used techniques such as Augmentation, Diminution, Melodic repetition, Melodic sequence, Quintal harmony, Dissonant interval, etc.

Figure 7
The development of theme by composition techniques.

The musical score for Figure 7 illustrates the development of a theme through various composition techniques. The score is divided into several systems, each with a red box highlighting a specific technique:

- Melodic repetition:** Highlighted in the Alto Saxophone part, showing the same melodic line repeated.
- Melodic sequence:** Highlighted in the Tenor Saxophone part, showing a series of related melodic phrases.
- Dissonant interval:** Highlighted in the Bass Saxophone part, showing intervals that create tension.
- Relative key and Chord progression:** Highlighted in the Piano part, showing changes in key and chord structure.

4.2.4 The concepts of music structure, rhythm, sound intensity.

The composition of structure, rhythm, and intensity in first movement “First Time”, the researcher arranges the harmonics from the gradation of the density of the melody from less intensive to more intensive harmonics for adjust the mood or felling of the audience to be consistent with the music and will gradually decrease the intensity near the end of each section. This section is like the researcher taking the audience stepping into the Faculty of Music and there will be a change in the rhythm of a variety of drum sets, like local music in the south of the northeast. And then, the sound intensity of this process, the researcher wants to present it in a form with a gradient from the least to the most to represent the climax of the song.



Figure 8
The structure, rhythm, and intensity.

5. Discussions

The following points based on the research results were discussed:

A Creative work: Program music on “Kreta-Kran” song for pop orchestra: First Time inspired by the atmosphere in the Faculty of Music, Bangkokthonburi University. The researcher interpreted the study of music literature, and interviews with music composition experts. This resulted in the creation of musical works that clearly expressed emotions and feelings resulting from the interpretation of those things, corresponds to with creative research “Sinfonia Siamindra” composed by Professor Dr. Narongrit Dhamabutra (2018) describes the use of sound to communicate the emotion of the song. It is also corresponds to with creative research, a “symphonic poem song for the trombone ensemble: Himmapan” composed by Dr.Thitinun Charoensloong (2021), who said that The sound of a variety of music can significantly lead the audience feelings to follow the song from beginning to end, and corresponds to with creative research “Orderless” composed by Dr.Nithi Junchomchaey (2022)

6. Conclusion

A Creative work: Program music on “Kreta-Kran” song for pop orchestra: First Time. The researcher creates compositions from the philosophy of the Faculty of Music, Bangkokthonburi University. This place is like a music learning center, and establish professional musicians, therefore making each day to hear



contrasting melodies. whether it is the melodies of local music, melodies of rock music, sound of Thai music and other musical melodies, sometimes resulting in a sound that is mixed until it feels strange from the original musical melody, the researcher therefore implies that the listener is walking inside the real place and experience the atmosphere of a variety of musical melodies at the same time used A minor as the main key of this process and changes it to C major in the B part, combining with various compositional techniques. which is like the development of the main melodies and finally, it is the return of the A part in the key of A minor again as a reminder of the melody that has been heard.

Table 1
Overview of structure.

Part	First movement: "First time"				
	Introduction	A	B	A'	Coda
Bar number	1-24	25-55	56-110	111-130	131-143

7. Recommendations

The following are recommendations based on the research results:

7.1 The concepts or learning theories of other educational scholars should be applied. Let's adapt it to practice with special techniques. To create and develop the form of exercises to be structured and interesting. make the practitioner learn better.

7.2 This creative work should be adapted to be up to date by creating multi-media in the form of E-Learning or E-Book, etc.

7.3 The composition should be developed to be more diverse and interesting. for those interested in other levels able to learn more.

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Interview.



The Role of Solar Energy in Agriculture for Young Smart Farmers in the Upper Northern Region of Thailand

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Abstract

This study examined the current state of solar energy in agriculture as well as the problems and obstacles faced by Young Smart Farmers in the upper northern region of Thailand, including the provinces of Chiang Mai, Chiang Rai, Phrae, Nan, Phayao, Mae Hong Son, Lamphun, and Lampang, when applying solar energy. Using a technique known as purposive sampling and descriptive statistics, only 30 farmers using solar energy for agriculture were selected. The study found that most farmers had a tertiary education, an upper-middle income, and a high level of access to solar energy news on social media YouTube ($\bar{x}=3.96$) and Facebook ($\bar{x}=3.42$), followed by farmers who received training in the Young Smart Farmers program ($\bar{x}=3.00$) and other knowledge sources at a moderate level ($\bar{x}=3.17$). The context of solar energy usage included systems that were not connected to the provincial electricity authority (Off-Grid) for water pumps, lighting, and power tools and connected to the local electricity authority (On-Grid) for electricity cost savings to reduce the burden of fuel costs and water management on the farm. In addition, solar power systems are simple to maintain, can be self-installed, and reduce global fuel consumption. Goal 7 of the Sustainable Development Goals (SDGs) was to ensure access to affordable, reliable, sustainable, and modern energy for all. The widespread problems and obstacles were that farmers carried the burden of high installation costs, a lack of knowledge of electronic equipment, and uncertainty from the current climate.

Keywords: application, role, solar energy, Young Smart Farmer



1. Introduction

The expansion of renewable energy capacity is anticipated to accelerate over the next five years, accounting for nearly 95% of the increase in global capacity through 2026. (Agency, 2021). Globally, the use of solar energy is expanding rapidly, from 39 GW (Gigawatts) in 2010 to 760 GW (Gigawatts) in 2020, and solar cell production capacity increased roughly 20-fold (Vo, 2022). Wind and solar energy are predicted to play a significant role in the future of all renewable energy systems (Editorial, 2022). To ensure global peace and prosperity by 2030, the Sustainable Development Goals (SDGs) were established in 2015. Every seventeen goals must balance social, economic, and environmental sustainability. Goal 7: Ensuring that everyone has access to affordable, reliable, sustainable, and modern energy is one of the energy goals. Clean energy, especially renewable energy, is one way to improve energy management efficiency and move toward sustainable development. This is done by considering the impact on the environment, reducing reliance on fossil fuels, and making it easier for people to access and buy renewable energy, which improves the quality of life, adapts to changes in the energy sector, boosts the role of digital technology, and moves toward electrification (NESDC, 2021).

As energy price volatility over the past decade has increased, the incentives for renewable energy have increased. Solar energy has become an alternative energy source with anticipation of independence and is cost-effective for agricultural use. Many countries develop solar energy as an alternative energy source, and in the United States, energy expenditures for growing crops and raising animals account for 9.0% of the total per year (Vick, 2011).

In China, a trend in industrial and agricultural development is to use solar energy in agriculture to provide green and sustainable energy in the agricultural sector. This includes greenhouse energy, solar fish breeding ponds, solar water treatment, solar water pumping, and new rural solar power stations (Xue, 2017).

The fulfilment of the European Green Deal on Agriculture-Photovoltaic (Agri-PV) provides innovative, efficient, and cost-effective solutions for promoting sustainable agriculture and a transition to clean energy. Incorporating solar energy on farmland would reduce land consumption at the same time. Solar energy is the most environmentally friendly, scalable, and cost-effective technology for assisting farmers. Therefore, it is a fundamental component of the European Green Deal and post-COVID-19 recovery by channelling new investments in solar power and supporting agricultural policy objectives. Innovative Agri-PV can drive system modernization, EU food security, and climate change resilience (SolarPowerEurope, 2020)

However, Thailand is located in the equatorial region and thus receives continuous and constant sunlight throughout the year. The average total solar radiation intensity per year across the country was found to be 18.2 MJ/m²/day, or 5.05 kWh/m²/day (AEDP, 2015). At present, the situation of renewable energy development in Thailand has been continuously improving due to the policy to promote the production and use of renewable energy, particularly solar energy. From 2012 to 2014, there was an increase of 16.3% per year in renewable energy in solar energy, with a tendency to decrease from 33 thousand tons of crude oil equivalent to only 25 thousand tons of crude oil equivalent (DEDE, 2018)



Although renewable energy has been developed and supported for more than ten years, its acceptance for actual use still needs to be clarified. Over the past few years, it has been applied to livelihood and agriculture. According to the current state of the world, solar energy technology is regarded as a crucial component of agriculture for independence. This study was carried out in the context of "Young Smart Farmers" in the upper northern region of Thailand, referring to farmers between the ages of 17 to 45 who have the potential to use modern technology in agriculture (DOAE, 2018), which is an age with the potential to apply modern technology to agriculture, by examining the context of solar energy usage in agriculture, access to information about solar energy technology, and obstacles to using solar energy, adapting past agricultural practices in order to develop guidelines for the promotion of solar energy in agriculture. The researchers intend to increase interest in solar energy for agriculture and contribute to future studies.

2. Research Objectives

This research consisted of 2 objectives:

2.1 To study the use of solar energy for agriculture in Young Smart Farmers in the Upper Northern Region of Thailand

2.2 To identify problems and make recommendations for using solar energy in agriculture

3. Research Methodology

3.1 Samples

Members of the Young Smart Farmers reside in eight provinces in the upper northern region of Thailand. Using a method called "purposive sampling" and choosing 183 people who regularly participate in the Young Smart Farmers project's activities, it was determined that 30 farmers use solar energy in agriculture. This includes three cases in Chiang Mai, four cases in Chiang Rai, four cases in Phrae, eight cases in Nan, two cases in Phayao, two cases in Mae Hong Son, three cases in Lamphun, and four cases in Lampang. This study analyzed data on Young Smart Farmers who exclusively use solar energy in agriculture ($n = 30$).

3.2 Research Instruments

The research instrument is a questionnaire designed by the researcher following the research objectives. It is a structured questionnaire consisting of closed-ended and open-ended questions and is divided into the following three sections:

Part 1: Basic information about farmers and questions about how the Young Smart Farmers who have used solar energy technology for agriculture have applied for it and how much they have used it.

Solar energy is used in agriculture, which means 1, continue the questionnaire.

No use of solar energy in agriculture, which means 0; stop the questionnaire.

Part 2: Information on solar energy news among Young Smart Farmers from different channels.

Part 3: An open-ended question about the problems and obstacles associated with using solar energy in agriculture.



3.3 Data Collection

There are two types of research methodologies:

3.3.1 The secondary data from a literature review, such as basic information on farmer households from the Provincial Agriculture Office in the upper northern region and academic documents, books, and relevant research results from various sources, including Internet-based research studies.

3.3.2 The primary data from observational data collection, the area survey, and the researcher-made questionnaire were sent online to a group of 183 Young Smart Farmers who continued to participate in activities with the project of Young Smart Farmers regularly. This was done to get information about the population (such as age, gender, and educational background) and the context of the Young Smart Farmers' use of solar energy technology for agriculture.

3.4 Data Analysis

3.4.1 Used descriptive statistics such as Percentage, Frequency, Mean, Minimum, and Maximum to describe essential personal characteristics. A weighted mean score and standard deviation were used to score the information on solar energy news perception and context grouping on the use of solar energy technology for agriculture by young smart farmers.

3.4.2 Analyzed problems, obstacles, and suggestions for using solar energy for agriculture by grouping and categorizing problems, obstacles, and suggestions that farmers gave in response to open-ended questions. These categories will be used as guidelines for the future use of solar energy for agriculture.

4. Research Results

4.1 General information for farmers.

The majority of the sample group of Young Smart Farmers graduated with a bachelor's degree; representing 73.33 per cent; their period of membership was primarily 1–4 years; representing 66.67 per cent, and most did not earn a degree in agriculture; representing 80 per cent. The average age of Young Smart Farmers was 39.53 years old, with an average annual income of 170,455 baht per year and an average of 6.2 years of agricultural experience.

Table 1
Farmers' information about the samples

No.	Personal Information	Frequency (n=30)	Percentage (%)
1	Education		
	Bachelor's Degree	22	73.33
	Diploma or Vocational Certificate	8	26.67
2	Become a member of YSF		
	1 to 4 years	20	66.67
	5 to 9 years	10	33.33
	Minimum 1 year	Avg. 3.83 years	



	Maximum 9 years S.D. 2.99		
3	Educational Qualification		
	Graduated in Agriculture	6	20.00
	Did not graduate in agriculture	24	80.00
<i>Table 1 (Cont.)</i>			
No.	Personal Information	Frequency (n=30)	Percentage (%)
4	Age		
	41 – 45 Years old	19	63.34
	30 – 40 Years old	7	23.33
	< 30 Years old	4	13.33
	Minimum 28 Years old Avg. 39.53 years old		
	Maximum 45 Years old S.D. 7.13		
5	Income	14	46.67
	<100,000 Baht/Year	14	46.67
	100,000 – 500,000 Baht/Year	2	6.66
	>500,001 Baht/Year		
	Minimum 10,000 Avg.170,455 Baht/Year		
6	Maximum 1,000,000 S.D.		
	250,189.97	19	63.34
		11	36.66
	Agricultural Experience		
	1 – 10 Years		
	>10 Years		
	Minimum 1 Year. Avg. 6.2 Years		
	Maximum 10 Years S.D. 3.56		

4.2 Solar energy usage context

Fifty per cent of Young Smart Farmers who use solar energy for agricultural purposes use between 1,000 and 3,000 W/h, while 40 per cent use less than 1,000 W/h. In agriculture, both of these usage periods are frequent. It is applied in both off-grid and on-grid systems, for example, for lighting the farm, charging batteries for nighttime backup power, and medium- and small-sized water pumps for vegetables, reserving water in tanks and clarifiers, working with ventilation systems in homes, televisions, charging communication tools, and general hand tools. Those who use more than 3,000 W/h are subject to the same type of application as those who use less than that amount. Only the amount and area of use go up, and there are good reasons to pick the primary ones, such as reducing the load on electricity, lowering production costs, saving money on fuel, and making agriculture more independent.



Table 2
Solar energy consumption and application statistics for the agricultural sector.

Solar Energy Consumption n Watt per hour	Frequency (n=30)	Percentage (%)	Application	Purpose of application
>3000 W/h	3	10.00	<ul style="list-style-type: none"> - An off-grid system used for lighting, battery charging, water pumps, and fans. - An on-grid system connected to the provincial electricity authority 	<ul style="list-style-type: none"> - Cost-effective and useful during daytime power outages. - Contribute to global warming reduction. - Save money on electricity bills and use it in an emergency.
1000-3000 W/h	15	50.00	<ul style="list-style-type: none"> - An off-grid system used for lighting, battery charging, water pumps, fans, television, electric drill, and electric grinder. - An on-grid system connected to the provincial electricity authority 	<ul style="list-style-type: none"> - Save on electricity and fuel costs, and do not need to use the hand crank to start the tractor. - Convenient. - Easy to maintain, requires no oil and can be assembled and installed by the user. - Electricity does not reach the farm. - Self-reliant.
<1000 W/h	12	40.00	<ul style="list-style-type: none"> - An off-grid system for farm lighting, small water pumps, walkway lighting, mobile charging, and greenhouse cooling fans. 	<ul style="list-style-type: none"> - Electricity does not reach the farm. - It is clean energy that does not affect the environment and reduces production costs. - Save money on electricity bills.



Solar Energy Consumption Watt per hour	Frequency (n=30)	Percentage (%)	Application	Purpose of application
				- Light is always present.

4.3. Information on solar energy news among young smart farmers.

From the analysis of the new generation of farmers' perceptions of solar energy through various channels, it was found that, generally, the amount of information farmers received on solar energy from various channels is moderate ($\bar{x}= 3.11$). When analyzing various news sources, it was discovered that farmers received the most news from social media, specifically YouTube ($\bar{x}= 3.96$) and Facebook ($\bar{x}= 3.42$). Information sources that farmers received at a medium level were training from other knowledge sources ($\bar{x}=3.17$) and training in the YSF project ($\bar{x}=3.00$).

Further research on social media channels for knowledge of solar energy by farmers found that there are Facebook groups and Facebook fan pages that exchange knowledge and buy and sell products related to solar energy, such as solar cells for your use, the cheapest solar cells, homemade solar cells that work, solar cells, inverters, batteries, lighting lamps, and all kinds of electrical equipment, etc. AmnardCenter Group, Phakdee Energy, TheplanetPower Chiangmai, Solar Cell Bear, Renewable Energy Little House, and others have YouTube channels that present solar energy knowledge and technology in the form of video clips.

Table 3

Information about solar energy news among young smart farmers.

Item	Levels	Mean \bar{x}	S.D.
1. Trained in the YSF project	Moderate	3.00	1.39
2. Trained from other sources of knowledge	Moderate	3.17	1.28
3. Facebook	High	3.42	1.03
4. YouTube	High	3.96	0.89
5. Television	Moderate	2.78	0.92
6. Neighbors, acquaintances	Moderate	2.89	0.99
7. Publications	Low	2.57	0.99
Total Mean	Moderate	3.11	

4.4 Problems and obstacles in using solar energy for agriculture.

Overall, the problems and obstacles encountered by the Young Smart Farmers who use solar energy for agriculture revealed that farmers bear the



burden of high installation costs, private company labour costs are still high today, some agricultural areas are far from major cities, where the installation cost varies with distance, causing the installation cost to increase, and products and equipment for solar cells are not available in some areas, necessitating the use of third-party products. Furthermore, a lack of knowledge of electronics makes it impossible for farmers to calculate the appropriate amount of use for their farming area since knowledge of electronics is still only basic, and maintenance still relies on electronic technicians from outside shops. During maintenance, due to damage, the electrical system in the agricultural area cannot be used (only the off-grid system), and uncertainty from the current climate, different seasons, the angle of the sun, and the installation location change every year. There may be future drawbacks to not utilizing the sun's full potential in fixed installations. Table 4 shows how responses to open-ended questions were grouped.

*Table 4
Problems and obstacles in using solar energy for agriculture.*

Problems	Number of Answers (Times)	Reasons
Financial	22	<ul style="list-style-type: none"> - Expensive equipment. - Lack of lump sum. - High labour cost for installation. - Expensive shipping. - System Maintenance Fee.
Knowledge	15	<ul style="list-style-type: none"> - Little basic electrical knowledge. - Lack of knowledge of area calculations. - Little specific knowledge of each device. - Only a few forms of application exist.
Physical	7	<ul style="list-style-type: none"> - There needs to be more sunlight in some seasons. - The direction of the light fluctuates every year. - The farm is located far from the area where equipment is traded.

5. Discussion

The following points were addressed according to the research findings:

5.1 In a sample group of Young Smart Farmers using solar energy technology, the age of the farmers was in the middle age range, and their education was at the graduate level. Although most farmers did not have a degree related to agriculture, they chose to pursue a career in agriculture, and the average annual



income from the agricultural sector had a high middle income. This is in line with Chacattrai (2018), who studied factors affecting the success of youth from agricultural households in Nakhon Ratchasima Province and stated that public relations for the Young Smart Farmer training program among young people who were successful in agriculture had the following factors: Income is one of the factors that encourages young people to inherit a career in agriculture in upper-middle-income households as well (Rayasawath, 2018)

5.2 The preceding use context has multiple applications depending on the suitability of the area and the agricultural activities of the young, intelligent farmers. Most of them have important reasons for applying, such as agricultural areas without access to electricity, reducing fuel consumption, saving money, and leading to self-sufficiency for farming outside the electric grid (off-grid). Furthermore, the burden of monthly electricity costs is considered in areas where farmers have access to electricity. Therefore, on-grid solar systems are installed to reduce electricity costs on their farmland. Farmer's usage context differs depending on the farming area. The suitability of each agricultural activity for Young Smart Farmers determines the application. In addition, there is concern about the global warming problem, which is getting more serious every day and helping the environment. Therefore, clean energy, such as solar energy, is viable for agriculture. This is in line with the Sustainable Development Goals (SDGs), Goal 7: ensure access to affordable, reliable, sustainable, and modern energy for all. (NESDC, 2021), and Thai Farmers in the 4.0 Era (NSTDA, 2016)

5.3 Important information sources for Young Smart Farmers to know about solar energy include social media YouTube and Facebook, as well as Xuan Liang & Huan Chen (2020) conducted a qualitative study on personal family-friendly local Chinese restaurant marketing communication strategies and said that social media has become a powerful marketing communication tool with its features of being affordable and flexible, and proposed that social media is the most effective alternative as it can reach a large audience in a short time with little or no cost (Xuan Liang & Huan Chen, 2020). In the context of Young Smart Farmers who are always curious, the government project's training on solar energy technology only raises awareness. However, an interest in solar energy technology has been pursued after completing the project's training, and further education is readily available through the internet and social media resources.

5.4 Suggestions for using solar energy for agriculture. Overall, farmers want the government to promote government subsidies, grants for various energy promotion projects, interest-free or low-interest loans from financial institutions in the country, tax reductions on solar energy equipment imports, lowering the cost of equipment so that farmers can purchase it at a lower cost and have more access to clean energy, and more training by engineers and experts each year to support clean energy knowledge for the agricultural sector, follow up on performance, analyze the results, and evaluate the break-even point to reduce the risk for farmers who decide on alternative energy.

6. Conclusion

Most Young Smart Farmers who use solar energy in agriculture have an average income no less than other occupations. Although most Young Smart



Farmers did not directly graduate in agriculture, they could return to farming with stability. Concerning solar energy news, knowledge of that technology has increased interest in solar energy technology. It has led people to seek more information about renewable energy from various sources of information, such as social media platforms such as YouTube and Facebook. The Young Smart Farmers can easily access and lead the adoption of technology in their agricultural activities. In terms of the context of using solar energy for agriculture, there are differences depending on its suitability in each area for farmers and its application in various forms, mainly for cost-saving and self-sufficient farming in modern times.

7. Recommendations

The recommendations derived from this study are: To promote the Young Smart Farmer training programs, there should be more emphasis on renewable energy, not only to create an awareness stage but also to promote by methods demonstration and result demonstration for farmers who participate in the training to have a trial run before deciding to apply to their agricultural sector. This could include issuing credits for agriculture in renewable energy and lowering import taxes on solar energy equipment so that farmers can easily access and use social media to be more helpful. The Young Smart Farmer is considered an important person to bring back to develop agriculture, representing a career in agriculture, because they learn quickly, are easy to train, and have technology leadership. Therefore, social media is a great way to communicate with farmers or young people interested in farming in the future.

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Development of Roof Insulation from Bamboo Charcoal and Natural Kaolin Clay

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Abstract

This research focused on the use of natural materials, which emit no pollutants and can be recyclable or biodegradable, for roof insulation. The bamboo charcoal and natural kaolin clay were chosen to mix with water and latex mixed with chemical for the roof insulation fabrication. The suitable ratio between bamboo charcoal and natural kaolin clay were carried out when the amount of water and latex were fixed at 200 g and 50 g, respectively. In addition, the effect of different thicknesses of insulation sheets on the insulation properties were investigated. From testing to determine the thermal conductivity of insulating panels according to ASTM C518, it was found that the thermal conductivity ranged from 0.0191 - 0.0837 W/m·K. The lowest thermal conductivity was found in the insulation specimen with a weight ratio of bamboo charcoal: natural kaolin clay: water: latex compound at 95: 5: 200: 50, respectively, at a thickness of 7 mm with the suitable insulation properties, according to TIS 535-2527. The microstructure of this specimen was tested with scanning electron microscopy (SEM) that good adhesion and porous surface on the roof insulation were presented. This research presented lower cost of the roof insulation from natural materials than that from MPE and glass wool. Therefore, it is possible to develop roof insulation from natural materials instead of insulation made from synthetic materials and chemical adhesives.

Keywords: Bamboo charcoal, kaolin clay, roof insulation, thermal conductivity

1. Introduction

Thailand is in the tropics, located in Southeast Asia, slightly north of the equator, giving the country a tropical climate. Moreover, in the present, global warming has inevitably affected human life and living things. There is also a tendency for the global temperature to increase more and more. The heat in our homes is mainly from the roof. Because it receives heat from direct sunlight, so to solve the problem of high temperature in the house should start with the roof first. Since the early 20th century, thermal insulation materials have been used as underlayment for homes to insulate against heat. Most of these materials are synthetic, such as gypsum board, extruded polystyrene, expanded polystyrene, polyurethane foam, and polyisocyanurate. Some commercial insulators have been presented in previous research (Asdrubali et al., 2015; Abu-Jdayil et al., 2019; Aditya et al., 2017; Schiavoni et al., 2016). Although these synthetic materials are



highly effective in thermal insulation, they harm the environment and health. Therefore, the use of natural materials is essential to creating a sustainable and healthy environment.

Currently, there are many researches to replace synthetic materials in thermal insulation. Natural materials are popular because they are low-density, highly porous, environmentally friendly, reusable, and cheap (Naghdi, 2021; Khalid et al., 2021; Ogundipe et al., 2021). Some studies have studied the utilization of natural fibers as raw materials for insulation, such as wood fiber (He et al., 2019; Cetiner & Shea, 2018; Nunes et al., 2015), bamboo fiber (Nguyen et al., 2018), sunflower fiber and vermiculite (Binici et al., 2020), and water hyacinth (Jaktorn & Jiajitsawat, 2014). In addition, there are various studies on the production of insulation sheets using natural materials from agricultural waste such as rice straw, rice husk (Wei et al., 2015; Padkho, 2012; Thomson & Walker, 2014; Muthuraj et al., 2019; Hareedy, Nasar & Sadek, 2019), corn stalks and corncobs (Paiva et al., 2012; Pinto et al., 2012; Pinto et al., 2011), date palm (Ali & Alabdulkarem, 2017; Benmansour et al., 2014; Chikhi et al., 2013; Agoudjil et al., 2011), coconut coir (Khedari, Charoenvai & Hirunlabh, 2003; Panyakaew & Fotios, 2011), sugarcane (Panyakaew & Fotios, 2011; Manohar, 2012), and durian peel (Jintakosol & Kumfu, 2012; Charoenvai, 2013).

From the research mentioned above, the use of materials to produce thermal insulation panels from natural materials is an interesting alternative. As Thailand is an agricultural country facing the problem of agricultural waste, this study has an idea to apply charcoal powder from natural materials, namely bamboo, a local plant in Prachinburi province. Bamboo charcoal and natural kaolin are used as natural materials in the mixture, and rubber is used as a binder to make roof insulation sheets. The ratio of ingredients to make insulation sheets will be developed to test the thermal insulation properties, according to TIS standards 535-2527 (TIS 535-2527, 1984) and (ASTM C948, 2009), such as density, water absorption, ultimate tensile strength, and thermal conductivity (ASTM C518, 2010). Moreover, the cost of producing roof insulation from natural materials is analyzed to assess the economic cost.

2. Research Objectives

This research was composed of four objectives:

1) To develop the roof insulation using natural materials of bamboo charcoal and kaolin clay, Prachinburi Province, Thailand, instead of the commercial synthesis materials;

2) To investigate the appropriate ratio of bamboo charcoal powder: natural kaolin clay: water: latex for forming roof insulation sheets with thicknesses of 3 mm, 5 mm, and 7 mm;

3) To test the thermal insulation properties, including thermal conductivity, density, water absorption value, and maximum tensile strength, and the microstructure using SEM; and

4) To evaluate the cost of natural materials using in this research to compare with the commercial cost of roof insulation from MPE and glass wool.



3. Research Methodology

3.1 Preparation of raw materials

The natural kaolin from Khok Mai Lai Subdistrict, Mueang District, Prachinburi Province, features a large lump mixed with powder to be coarsely crushed and crushed with a stone mortar sifted through a fine sieve of 20-25 microns. Moreover, in the preparation of bamboo charcoal powder, the Tongsriprachin bamboo with old stems from Saphan Hin Subdistrict, Na Di District, Prachinburi Province, was used to cut into pieces. It was then dried at 60 °C, baked in a hot air oven at 200 °C for 12 hours, then ground until it turned into fine charcoal with a mortar and sifted through a fine sieve of 20-25 microns.

3.2 Mixture preparation and sample material forming

In the material preparation, the 12 mixed weight ratios of bamboo charcoal: natural kaolin: water: latex were varied according to Table 1 to prepare the samples at 3 mm, 5 mm, and 7 mm thicknesses. All samples were then placed in a hot-air incubator. They were baked at 100 °C for 2 hours.

Table 1
Mixing ratio by weight in roof insulation

Type	Weight ratio (g) Bamboo charcoal: Natural Kaolin: Water: Latex compound
1	0 : 100 : 200 : 50
2	99 : 1 : 200 : 50
3	98 : 2 : 200 : 50
4	97 : 3 : 200 : 50
5	96 : 4 : 200 : 50
6	95 : 5 : 200 : 50
7	94 : 6 : 200 : 50
8	93 : 7 : 200 : 50
9	92 : 8 : 200 : 50
10	91 : 9 : 200 : 50
11	90 : 10 : 200 : 50
12	100 : 0 : 200 : 50

3.3 Analysis of structural properties of sample materials

Scanning electron microscopy (SEM) was used to determine the physical structure or morphology, and sheet adhesion of the sample materials.

3.4 Insulation properties test

The properties of roof insulation sheets according to the Industrial Standard (TIS 535-2527), such as density, water absorption, tensile strength, and thermal conductivity, were tested by using the methods as follows:

3.4.1 Thermal conductivity of insulating sheets



As presented in Figure 1, the equipment includes a middle baffle assembly to place the test specimens of insulation sheets. The upper level was used as a directly heated section, 6 cm × 6 cm × 12 cm. The lower level was applied as a room inside the house, 6 cm × 6 cm × 12 cm as above. The light bulb uses a 100-watt incandescent bulb equipped with two digital thermometers to measure air temperature in the upper and lower chambers. Before testing, the temperatures of the upper and lower chambers must be the same at 28 °C. First of all, in the cabinet without insulation, the bulb was turned on for 10 minutes, and then the temperatures of the upper and lower cabinets were recorded. After that, the bulb was turned off until the upper and lower cabinet temperatures were the same at 28 °C again. Next step, the fabricated insulating plate was placed on the middle baffle, and the bulb was turned on for 10 minutes; the upper and lower cabinet temperatures were measured to calculate the thermal conductivity using equation (1).

$$Q = k\Delta T / \Delta X \quad (1)$$

where Q is the heat flux (W/m^2), k is the thermal conductivity ($W/m\cdot K$), ΔX is the thickness of the insulation sheet (m), and ΔT is the temperature difference on both sides of the sample (K).

3.4.2 Density

The specimen measuring 5x5 cm² was cut and weighed on two digital scales. Length, width, and thickness were measured using a Vernier as a measuring tool, then find the average density from equation (2).

$$D = m/V \quad (2)$$

where, D is the density of the object (kg/m^3), m is the mass of the object (kg), and V is the total volume of the object (m^3).

3.4.3 Water absorption value

The specimen measuring 9.5 x 9.5 cm² was cut and weighed on two digital balances before immersion ($W1$). The specimen was placed in the same plane as the water level, with the upper edge approximately 20 mm below the water surface. The test piece was soaked for 24 hours, removed from the water, and weighed ($W2$) to determine the percentage of water absorption as given by equation (3).

$$WA = ((W2 - W1) / W1) \times 100 \quad (3)$$

where, WA is the percentage of water absorption, $W1$ is the weight before soaking (g), and $W2$ is the weight after immersion (g).

3.4.4 Maximum tensile strength



The test specimen size 5 x 5 cm² was cut; the wire tied with the specimen hanged at a height of 1 m from the floor. The bottom of the specimen was then weighed with sandbags by adding a weight of sand until the test strip was torn. The maximum tensile strength was calculated as equation (4).

$$F = mg \tag{4}$$

where, *F* is the maximum tensile strength (N), *m* is the mass of sand (kg), and *g* is the Earth's gravity using 9.81 m/s².

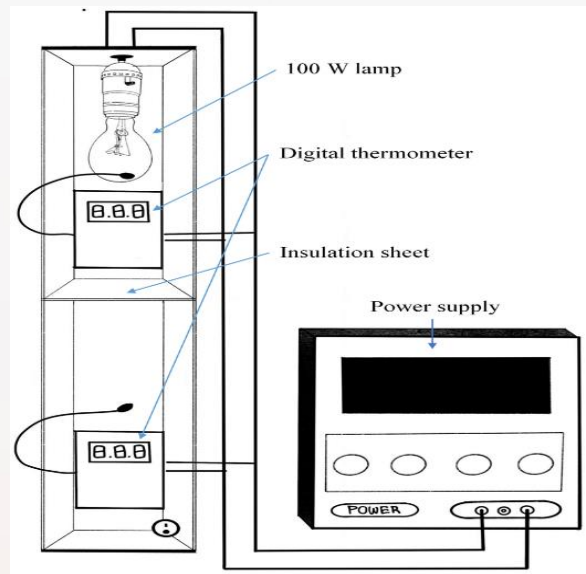


Figure 1. Chamber for testing the thermal conductivity of insulating plates

4. Research Results

4.1 Thermal conductivity of insulating sheets

Table 2 shows the thermal conductivity of roof insulation sheets, natural materials of different thicknesses of 3, 5, and 7 mm. It was found that the ingredients of raw materials Type 1 with the weight ratio of bamboo charcoal: natural kaolin: water: latex compounds at 0: 100: 200: 50 respectively, they cannot be thermal insulation. Since the natural kaolin is mixed with water and latex, those substances were coagulated before pouring into molds.

Table 2

Thermal conductivity of roof insulation sheets from natural materials

Type	Thermal Conductivity (W/m·K)		
	3 mm	5 mm	7 mm
1	N/A	N/A	N/A



2	0.0370	0.0343	0.0266
3	0.0554	0.0205	0.0249
4	0.0324	0.0260	0.0248
5	0.0837	0.0377	0.0267
6	0.0373	0.0210	0.0191
7	0.0412	0.0258	0.0246
8	0.0369	0.0279	0.0257
9	0.0369	0.0249	0.0235
10	0.0420	0.0497	0.0298
11	0.0826	0.0327	0.0271
12	0.0775	0.0256	0.0250

Type 2 to Type 12 could be created on the insulating board as bio-charcoal and natural kaolin were alkaline. Also, both substances were mixed with latex, they were not coagulated before pouring into molds. Therefore, the thermal conductivity of the insulating board was tested based on ASTM C518. It was found that the thermal conductivity was between 0.0191 - 0.0837 W/m·K. The lowest thermal conductivity was found at Type 6, a thickness of 7 mm, which has a ratio of bamboo charcoal: natural kaolin: water: latex compounds at a weight ratio of 95: 5: 200: 50, respectively.

4.2 Insulation properties of insulation sheets according to Thai industrial standards (TIS 535-2527)

In using the insulation sheet for testing the properties of the insulation sheet based on the Thai industrial standard (TIS 535-2527), as shown in Table 3, the thermal insulation properties of the natural material roof insulation sheet of Type 6 with a thickness of 7 mm have passed the industry standards in 3 aspects, namely, the density was 12.21 kg/m³, water absorption was 9.41% and the ultimate tensile strength is 455.33 N. An evaluation of the cost of natural materials, including bamboo charcoal, kaolin clay, and latex compound, was conducted for the development of natural roof insulation compared with commercially available roof insulation, as shown in Table 4. It was found that the price of roof insulation from natural materials was 63.13 baht/m², which is lower than the one that is sold in the market, both MPE and fiberglass flat sheet insulation.

Table 3
Thermal insulation properties of natural material roof insulation sheet of Type 6 at 7 mm thickness

Thermal insulation properties	Industrial Standards	Measured Value	Summary Pass/Fail
Density	Less than 350 kg/m ³	12.21 kg/m ³	Pass
Water absorption	Less than 10 %	9.41 %	Pass
Maximum tensile strength	Greater than 450 N	455.33 N	Pass



Table 4
Price comparison between the natural roof insulation sheet and the commercial roof insulation sheet

Insulation type	Price per square meter (Baht/m ²)
This research	63.13
MPE	69.44
Glass wool	91.67

4.3 Microscopic Analysis

Regarding the testing of the Type 6 insulation sheet at a thickness of 7 mm under a scanning electron microscope (SEM) to investigate the structure and morphology of the material as shown in Figure 2 (A) and (B) for the surfaces and cross-sectional materials. It was found that the surface was conditioned from bamboo charcoal mixed with natural kaolin, it was uneven pore size is about less than 50 μm and it has good adhesion in the porous surface. This affected the density properties, water absorption, maximum tensile strength, and thermal conductivity of the insulation.

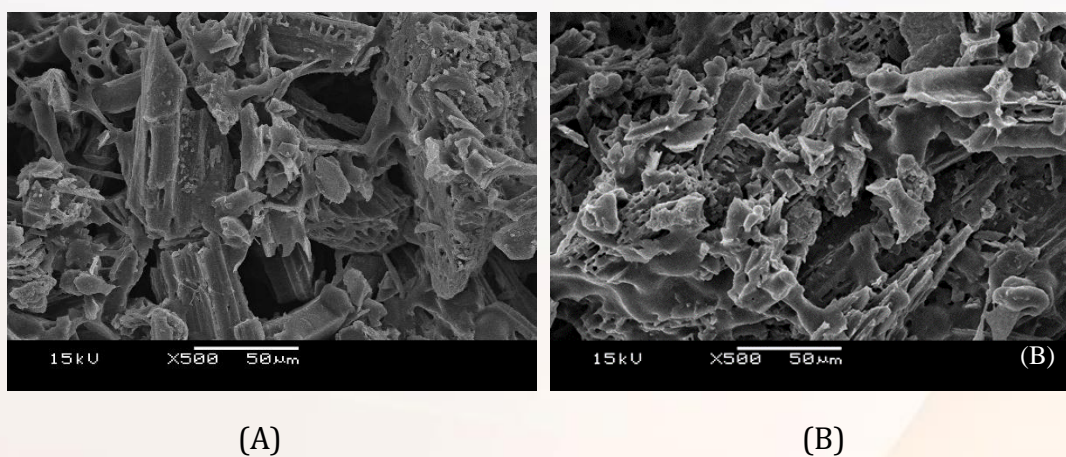


Figure 2. Structure and morphology of the sample material (A) Surface (B) Material cross-section

5. Discussion

Roof insulation sheet made from natural materials of Type 6 formula seemed to be a good roof insulation sheet because it gave good adhesion to the sheet, was easy to bend, and had bamboo charcoal powder, kaolin clay, and distilled water dissolved together and mixed with a latex that made all the ingredients homogeneous. This formula showed the roof insulation sheet to be firm, smooth, uniform, and easy to bend. The thermal insulation properties of the roof insulation made from natural materials of Type 6 at 7 mm thickness passed the industry standard because the mixture ratio in the developed formulas contained a higher ratio of bamboo charcoal powder than kaolin and an



appropriate amount of latex mixed with chemicals used as a binder. As a result, the insulation passed the industry standard. An increase in the thickness of roof insulation made from natural materials affected better thermal insulation properties such as density, water absorption, and maximum tensile strength because the increasing amount of ingredients made it more clumped together. The structure of charcoal and kaolin is porous, resulting in more moisture absorption as well. The reduced thermal conductivity was due to increased thickness and greater porosity to absorb heat.

The heat transfer coefficients of different insulation materials are shown in Table 5. The thermal conductivity of 0.0191 W/m·K for the chosen formula Type 6 with 7 mm thickness in this research was compared with the thermal conductivity of various natural materials; the use of bamboo charcoal mixed with kaolin clay gave a thermal conductivity close to the heat transfer coefficient of rice straw insulation, sugarcane, palm dates, pineapple leaves, and cotton (stem). Thermal insulation from natural materials obtained in this research is comparable to the use of water hyacinth as a raw material (Jaktorn & Jiajitsawat, 2020). Moreover, Nguyen et al. (2018) presented the insulation produced by a mixture of bamboo waste that had a higher thermal conductivity of 0.1000 W/m·K. The thermal conductivity of this research was lower than that of wood fiber, sunflower/gypsum, rice husk, corn cob, coconut coir, oil palm, and banana/PP.

Table 5
Thermal Conductivity of Various Insulation Materials

Raw material	Thermal conductivity (W/m·K)	Reference
Bamboo charcoal/kaolin clay	0.0191 - 0.0837	This research
Wood chips	0.0550	(Cetiner & Shea, 2018)
Bamboo	0.1000	(Nguyen et al., 2018)
Wood fiber	0.1100	(Muthuraj et al., 2019)
Sunflower/Gypsum	0.1340 - 0.2190	(Binici et al., 2020)
Water hyacinth	0.0250 - 0.0310	(Jaktorn & Jiajitsawat, 2020)
Rice straw (RSTIB)	0.0510 - 0.0530	(Wei et al., 2015)
Rice straw	0.030 - 0.090	(Padkho, 2012)
Rice husk	0.080 - 0.140	(Muthuraj et al., 2019)
Corn cob	0.1010	(Paiva, et al., 2012; Pinto, 2012)
Palm dates	0.0720 - 0.0850	(Mourad, et al., 2013; Agoudjil et al., 2012)
Coconut coir	0.0540 - 0.1430	(Khedari, 2012)
Sugarcane	0.0460 - 0.0680	(Panyakaew & Fotios, 2011; Manohar, 2012)
Durian peel	0.0260 - 0.1090	(Jintakosol & Kumfu, 2012; Charoenvai, 2013)



Oil palm	0.0550 - 0.0910	(Manohar, 2012)
Banana/PP	0.1570	(Paul et al., 2008)
Cotton (stem)	0.0585 - 0.0815	(Zhou et al., 2010)
Pineapple leaves	0.0350 - 0.0420	(Tangjuank, 2011)

Additionally, the price of roof insulation made from natural materials was lower than that of roof insulation that is sold in the market because natural materials, including bamboo charcoal powder, are from local plants.

6. Conclusions

Commercial insulation materials such as extruded polystyrene gypsum sheets, expanded polystyrene, polyurethane foam, and polyisocyanurate are synthetic materials. Although these synthetic materials provided excellent thermal insulation, they were hazardous to both the environment and human health. Therefore, the proposed work reports on the use of natural materials to create a sustainable and healthy environment. Natural materials such as charcoal, bamboo, natural kaolin, water, and latex were used to make the roof insulation sheets. The thickness of the sample material was diverse. The thermal conductivity of roof insulation sheets based on ASTM C518 has been checked to select the optimal mixing and thickness ratio.

The result showed that the thermal conductivity was between 0.0191 - 0.0837 W/m.K. The lowest thermal conductivity of Type 6 was found at a thickness of 7 mm, with 0.0191 W/m.K which was mixed with the ratio of bamboo charcoal: natural kaolin: water: latex compound at a ratio of 95: 5: 200: 50. Moreover, the features of density, water absorption, and maximum tensile force comply with industry standards (TIS 535-2527) and ASTM C948. The proposed work made use of natural materials for roof insulation to create a sustainable and healthy environment that was also cheaper than commercial insulation.

7. Recommendations

The recommendations focused on future work are as follows:

7.1 Because Thailand is an agricultural country with seasonal fruits throughout the year, the study of the insulation production from natural materials in Thailand, such as durian peel, rambutan peel, and mangosteen peel, should be supported. These natural materials can be considered renewable materials. It is another way to reduce agricultural waste.

7.2 Insulation degradation and reuse time should also be investigated.

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Development of Flame Retardant Insulation from Natural Materials

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Abstract

Flame retardant insulation is crucial in preventing damage to life and property from fire in residences and industries. The advantages of renewability and environmental friendliness of natural materials motivated the development of flame retardant insulation using local bamboo and kaolin clay in Prachinburi Province, Thailand. The flame retardant insulation made from the appropriate mixture of bamboo charcoal powder, natural kaolin clay, water, and latex compounds that can be formed into flexible and bendable sheets was investigated in this study. The effects of mixed formula and thickness of flame retardant insulation sheets on flammability tests were performed according to ASTM D3801 and ASTM D635 for the vertical and horizontal positions, respectively. The lowest burning rate was presented when the mixed formula of bamboo charcoal, natural kaolin clay, water, and latex compound was 99, 1, 200, and 50 g. Therefore, the result for the mixture with the addition of more bamboo charcoal showed a lower burning time for the vertical test and a lower burning rate for the horizontal test. The results showed vertical burning obtained V-0 classification and horizontal burning obtained HB classification. The selected mixing ratio and 7 mm thickness resulted in a flame retardant insulation sheet with good adhesion and a high porosity surface, as investigated by scanning electron microscopy (SEM).

Keywords: Bamboo charcoal, flammability test, flame retardant insulation, kaolin clay

1. Introduction

Nowadays, fire incidents in residences and industrial factories tend to increase in frequency and intensity, causing loss of life and property arising from accidents, negligence, or natural disasters. Although the insulations made from petroleum-based foam, such as polyurethane, expanded polystyrene, and polyethylene, are materials to achieve energy conservation due to their low cost, light weight, and low thermal conductivity, in the event of a fire, common commercial thermal insulations have been extremely limited by the disadvantages of high flammability (Cao et al., 2021). In addition to being good fuel, they also produce toxic fumes from incomplete combustion. The flammability of polymers can be reduced by adding flame retardants (Jiang et al., 2014). The most generally used flame retardants are based on ammonium, alkaline-earth metallic compounds, boron, graphite, halogen, nitrogen-containing compounds,



phosphorus (P), silicate or mixtures thereof (Ngo, 2020). Many studies have focused on adding chemicals or natural materials used for flame retardants and slowing the spread of fire to plastics (Schartelel et al., 2003; Zhang & horrocks, 2003; Sain et al., 2004; Matko et al., 2005; Stark et al., 2010; Liu et al., 2014) and wood or wood-based materials (Chen, et al., 2020; Chen, et al., 2021) which affects performance and improves flame retardant properties.

Due to the environmental impact and the continuous depletion of petroleum resources, green materials and natural renewable materials are gaining more and more attention for various industrial applications. The incorporation of renewable resources in materials is an effective way to reduce environmental impact and promote sustainable development in industries. Lazko et al. (2013) proposed flame retardant insulation made from lignocellulosic agro-materials from flax short fibers, adding with flame retardant agents, among which aluminium tri-hydroxide, zinc borate, melamine phosphate, and melamine borate. Acuña et al. (2021) developed the flame retardant of biomass castor oil-based rigid polyurethane foams as fire safety thermal insulation materials via the incorporation of expandable graphite and graphene oxide on a total fixed amount of 6 wt%. Furthermore, the layer of charcoal and silicon-based compounds, such as silica as inert diluents is used as a flammable barrier (Madyaratri et al., 2022). Carbon-based materials, such as expandable graphite, carbon black and carbon nanotubes, have spawned significant interest in the fabrication of polymer composites/nano-composites with greatly improved flame retardant performance because a layer of graphite can prevent heat and oxygen permeating into the polymer matrix, consequently improving the fire resistance (Wang et al., 2017; Araby et al., 2021). Zhang et al. (2021) improved the flame retardancy of polylactic acid composites with an alternative flame retardant filler based on phosphate- and urea-grafted bamboo charcoal (BC-m) at 20–30 wt % addition, giving a UL-94 vertical flame test rating of V-0. Bamboo is mainly cultivated in Thailand and is considered to be the main cash crop of Prachinburi Province due to the suitable area; bamboo has been planted for a long time. As Thailand is an agricultural country facing the problem of agricultural waste, this study created an idea to apply charcoal powder from local bamboo as the flammable resistance.

Moreover, kaolin clay is a natural material mainly consisting of silica (SiO_2) and alumina (Al_2O_3) (Mohd Mortar et al., 2022) that is used to improve flame retardant properties (Shehata, Hassan & Darwish, 2004; Batistella et al., 2016). Ou et al. (2021) improved the flame retardancy of low density polyethylene that the intercalation of modified kaolin with urea prepared by mechanochemical method and combined with intumescent flame retardant. The mixing of kaolin and other retardant materials received attention to improve the flame resistance for polymer insulation such as nano-kaolin and nano-HAO (nano-sized hydroxyl aluminum oxalate) for flame retarding the low density polyethylene (LDPE)/ethylene propylene diene rubber (EPDM) blends (Chang et al., 2007). However, there is no research concerning the mixture of flame retardant of the bamboo charcoal and kaolin clay. Consequently, this research considered to use the natural kaolin clay as the flame retardant material together with the bamboo charcoal mixed with latex compound to produce the flame retardant insulation.



The main concept of this fire retardant insulation development was to investigate eco-friendly materials from renewable resources to replace conventional materials. This research emphasized the use of natural materials in the local area of Prachinburi Province, including bamboo charcoal and natural kaolin clay with latex as binder to develop the flame retardant insulation sheets.

2. Research objectives

The main objectives of this research are to develop fire retardant materials using natural resources such as bamboo charcoal and kaolin clay and to determine the suitable mixture, including bamboo charcoal powder, natural kaolin clay, water, and latex compound, for fabricating flame retardant insulation sheets and the proper thickness by testing the vertical and horizontal burning, where the lowest burning time for the vertical test and the lowest burning rate for the horizontal test are the criteria for selection of the suitable mixture and thickness.

3. Research methodology

3.1 Preparation of raw materials

The natural kaolin from Khok Mai Lai Subdistrict, Mueang District, Prachinburi Province, features a large lump mixed with powder to be coarsely crushed and crushed with a stone mortar sifted through a fine sieve of 20-25 microns. Moreover, in the preparation of bamboo charcoal powder, the Tongsriprachin bamboo with old stems from Saphan Hin Subdistrict, Na Di District, Prachinburi Province was used to cut into pieces. It was then dried at 60 °C, baked in a hot air oven at 200 °C for 12 hours, then ground until it turned into fine charcoal with a mortar and sifted through a fine sieve of 20-25 microns.

3.2 Mixture preparation and sample material forming

The fire retardant insulation was fabricated by using bamboo charcoal, natural kaolin clay, water, and latex compound. All components were mixed in mass ratios according to Table 1. The mixing slurry was then placed in a hot-air incubator and heated at 100 °C for 2 hours. The insulation sheets were then formed, as shown in Figure 1. The three different thicknesses of 3 mm, 5 mm, and 7 mm were formed for each formula.

3.3 Flammability tests

Flammability testing is a vital part of ensuring the safety and reliability of products as well as meeting quality control and industry and regulatory requirements (Ngo, 2020). The flame retardant properties of the natural material insulation were evaluated using two flammability tests. These tests were carried out according to ASTM D3801 and ASTM D635 for vertical and horizontal flammability procedures, respectively. The test samples were with cut out the insulation sheet with the same dimensions for both vertical and horizontal burning tests. The sample length and width were 125 mm and 13 mm with the thickness of 3, 5, and 7 mm. For the vertical burning test, the burning time was measured according to the test procedure. For the horizontal burning test, after the flame reached the 25 mm marked from the end of the specimen, the time (t) in seconds starts to be measured until the flame extinguishes. the burned length (L_b)



was measured in millimeters. The linear burning rate (V) in millimeters/min is calculated using equation (1) (Silva et al., 2021)

$$V = 60L_b / t \tag{1}$$

Table 1
Mixing mass ratio in flame retardant insulation sheets

Type	Weight ratio (g)
Bamboo charcoal: Natural Kaolin: Water: Latex compound	
1	99 : 1 : 200 : 50
2	98 : 2 : 200 : 50
3	97 : 3 : 200 : 50
4	96 : 4 : 200 : 50
5	95 : 5 : 200 : 50
6	94 : 6 : 200 : 50
7	93 : 7 : 200 : 50
8	92 : 8 : 200 : 50
9	91 : 9 : 200 : 50
10	90 : 10 : 200 : 50



Figure 1
The sample of flame retardant insulation sheets fabricated from Type 1 formula



3.4 Analysis of structural properties of sample materials

Scanning electron microscopy (SEM) was used to determine the physical structure or morphology, and sheet adhesion of the sample materials.

4. Research results

4.1 Vertical flammability test

Table 2 illustrates the results for the vertical flammability test, considering the effects of the amount of bamboo charcoal and kaolin clay and the insulation sheet thickness on the burning time. An increase of amount of bamboo charcoal and a decrease of kaolin clay obtained a tendency of decreasing burning time after removing the ignition source until flame extinguishes. This research considered the material flammability classifications for the vertical burning test method (ASTM D3801), obtaining V-1 rating for all formulas with a 3 mm thickness. At a 5 mm thickness, Type 1 and Type 2 formulas achieved vertical burning of V-0 classification. For 7 mm thickness, the amount of bamboo charcoal above 94 g and the amount of kaolin clay lower than 6 g at the fixed amounts of water and latex compound of 200 g and 50 g, respectively, enhanced fire resistance V-0. The best results were obtained for materials containing a high amount of bamboo charcoal, achieving a V-0 classification. The samples of Type 1 formula of 5 mm and 7 mm thickness were observed as soon as the burner was removed.

4.2 Horizontal burning test

Table 3 shows the results for the horizontal flammability test. In this horizontal test, the key criterion to classify the materials is the linear burning rate. The results of the horizontal burning test showed that Type 1 formula at 3 mm and 5 mm thickness had the lowest burning rates of 10.2 and 5.1 mm/min, respectively, while at

Table 2

The vertical burning test of flame retardant insulation sheets from natural materials

Type	Burning time after removing the ignition source until extinguishing (s)		
	3 mm	5 mm	7 mm
1	10.61	6.59	3.64
2	13.04	9.87	4.14
3	14.79	10.48	4.88
4	16.40	12.67	6.17

5	17.47	14.56	6.93
6	19.11	15.28	8.36
7	19.76	16.56	10.45
8	20.50	17.40	11.96
9	22.64	18.12	12.78
10	27.87	20.14	14.55

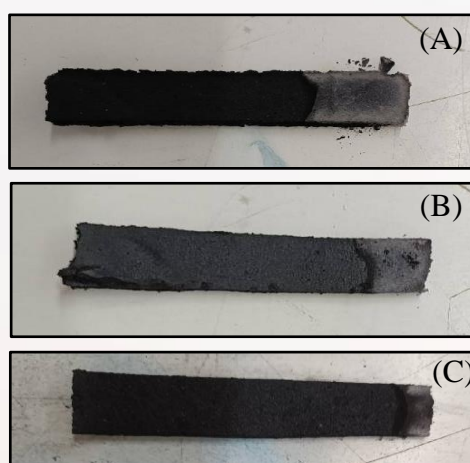


Figure 2
Burning of the flame retardant insulation sheets made from natural materials
(A) 3 mm, (B) 5 mm, and (C) 7 mm thickness

7 mm, all formulas were non-burning. It was observed that although it ignited in the beginning, it extinguished itself before reaching the specified distance at the 25 mm mark, as shown in Figure 2. For 3 mm and 5 mm thickness, when the test criterion for test specimen thickness was 3-13 mm at a burning rate less than 40 mm/min, the flammability rating obtained HB classification. For 7 mm of thickness, when the flame is extinguished before the first mark, the flame resistance achieved HB rating.

Table 3
The horizontal burning test of flame retardant insulation sheets at thicknesses of 3, 5, and 7 mm.



Type	burning rate (mm/min)		
	3 mm	5 mm	7 mm
1	10.2	5.1	non-burning
2	14.9	6.4	non-burning
3	26.9	10.2	non-burning
4	20.1	9.2	non-burning
5	22.0	8.8	non-burning
6	19.1	7.8	non-burning
7	13.4	10.0	non-burning
8	13.2	8.6	non-burning
9	11.3	9.6	non-burning
10	14.6	8.3	non-burning

4.3 Microscopic analysis

Figures 3 (A) and (B) illustrate the surfaces and cross-sectional materials of the Type 1 formula of flame retardant insulation sheets of a thickness of 7 mm using SEM to investigate the structure and morphology of the material. It was found that the surface was conditioned with bamboo charcoal mixed with natural kaolin, and there was a large amount of charcoal powder on the porous surface, resulting in the flame resistance of the flame retardant insulation sheets.

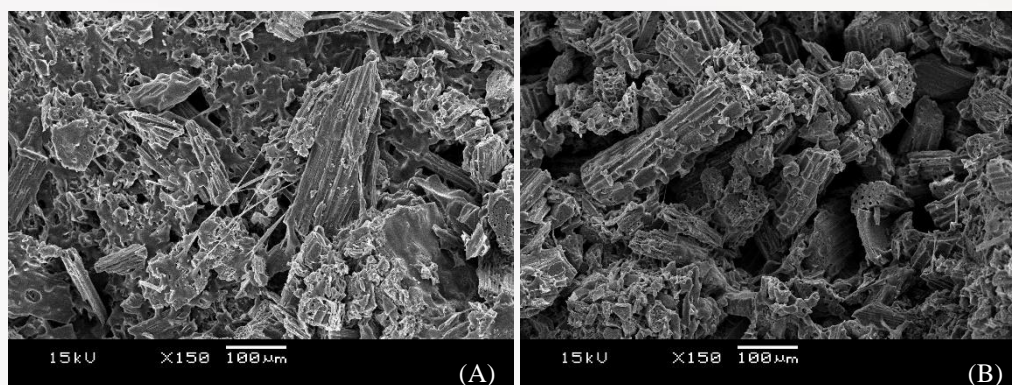


Figure 3
Structure and morphology of the sample material (A) surface and (B) cross-section

5. Discussion

The fabricated flame retardant insulation had a good adherence to the sheet and easy to bend because bamboo charcoal powder, kaolin clay, and distilled water are dissolved together and mixed with a latex into homogeneous slurry. The insulation sheet was firm, smooth, uniform and easy to be bent. The flame retardant properties of the flame retardant insulation from natural materials of Type 1 formula at 7 mm thickness, it achieved a V-0 classification of vertical burning test and a HB rating of the horizontal burning test because bamboo charcoal powder (Zhang et al, 2021) and kaolin clay (Shehata, Hassan & Darwish, 2004; Batistella et al., 2016) are the flame resistant materials that are a non-flammable material considered as a flame retardant component. Although latex made from natural rubber was used as binder to increase strength, elasticity, toughness, and durability for insulation sheets, natural rubber has flammable properties. However, the amount of latex compound used for insulation fabrication was lower than the amount of flame resistance mixture of bamboo charcoal and kaolin clay. Therefore, the higher thickness and the higher amount of bamboo charcoal achieved V-0 classification in vertical flammability test according to ASTM D3801 and HB rating in horizon flammability test according to ASTM D635. At 7 mm thickness, the flame retardant insulation was able to extinguish the fire by itself and also found that an increase of proportion of carbon made from bamboo charcoal reduced the combustion rate. However, the mixture of kaolin clay was very important for the insulation sheet formation, in the preliminary study, an absence of kaolin clay showed that the insulation could not be formed as the sheet. For the flame retardant property, it was found that the bamboo charcoal gave the better flame resistance property than natural kaolin clay. This results supported with the research of a study of mixture of kaolin and modified kaolin as the flame retardant materials in polypropylene (Shehata et al., 2004) that It can be concluded that the use of a mixture of modified kaolin and kaolin in different compositions improved the rate of burning better than polypropylene samples containing only kaolin or modified kaolin.

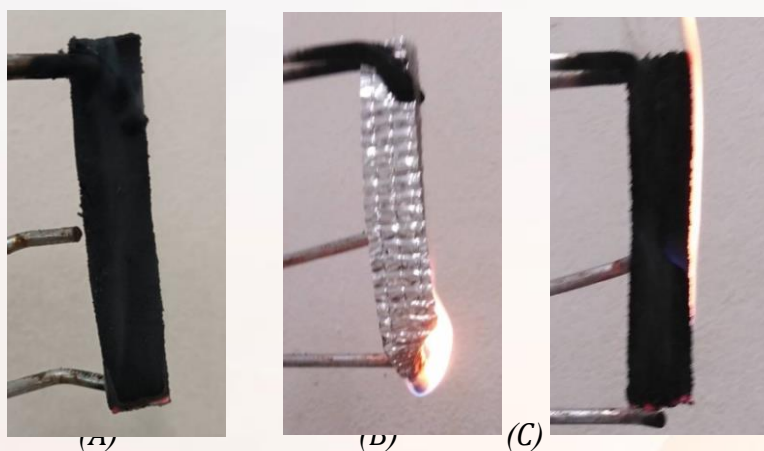
In addition, as shown in Table 4 and Figure 4, the flame retardant insulation made from natural materials in this research was compared with a commercial



roof insulation made from MPE and a commercial acoustic polyethylene board; the results showed that the burning rate of natural insulation was lower than that of commercial insulation and acoustic board made from polyethylene. This was because commercial roof insulation sheet and acoustic polyethylene board contains flammable ingredients but major components of natural insulation are bamboo charcoal as flame resistance.

*Table 4
Flame resistant comparison between the natural flame retardant insulation sheets and the commercial insulation sheet*

<i>Insulation type</i>	<i>Vertical flammability rating</i>	<i>Burning rate (mm/min)/ Horizontal flammability rating</i>
Natural materials of Type 1 formula at 7mm thickness	V-0	non-burning/HB
MPE 7mm	NC	154.0
acoustic polyethylene board 7 mm	NC	126.7



*Figure 4
Burning of the flame retardant insulation sheets from natural materials (A) MPE (B) and (C) acoustic polyethylene board*

6. Conclusions

In summary, we have successfully fabricated flame retardant insulation using natural materials, including bamboo charcoal, natural kaolin clay, water, and latex compound. An increase in bamboo charcoal improved the flame retardant property. Moreover, an increase in the insulation thickness decreased the vertical burning time and the horizontal burning rate, especially at 7 mm thickness, where they were non-burning in all fabricated formulas. At 7 mm thickness, flame retardant insulation sheets made from natural materials, including 99 g of bamboo charcoal, 1 g of kaolin clay, 200 g of water, and 50 g of latex compound, gave the



best flame resistance, with V-0 classification in the vertical flammability test and HB rating in the horizontal flammability test. The results showed that the bamboo charcoal presented better flame retardant properties than natural kaolin clay. However, the natural kaolin clay was very important for making mixed elements stick together in sheets.

7. Recommendations

The following are some recommendations based on the research results:

To support more discussion about the advantages of bamboo charcoal and kaolin clay as flame retardant materials, the thermogravimetric analysis (TGA), mass loss cone calorimeter, and limiting oxygen index (LOI) tests should be performed. However, the limitations of financial support and equipment obstructed these material characterizations in this study.

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Rajabhat Dataset: a dataset of skills identification

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Abstract

How can the dataset describe the skills of the individual students as personal skills? This question motivates this research based on every university providing courses and examinations for students and staff. This study aims to design a skills dataset and use Artificial Intelligence (AI) to identify the skills. In addition, it describes the abilities and expertise of a person in a specific area, such as strengths and weaknesses. Therefore, the university can use these results to provide matched learning styles, training courses or materials, and even learning opportunities for their skills.

There are many tools to identify the skills, such as quizzes or examinations, interviews, self-assessments, etc. This study introduces English skills that are essential and used as the sample data by collecting the existing five-year data of the VRU-TEP (Valaya Alongkorn Rajabhat University Test of English Performance) dataset and producing the visualisation.

Finally, this skills dataset locates in Rajabhat Dataset and used in training/testing with Machine Learning algorithms. It is also available to share and reuse with the other Rajabhat University as a strategy for improving their skills in a university. For example, it prepares suitable courses for absence skills, whereas the presence abilities also need to be increased. This reduces a time-consuming process that impacts the budget and educational systems. It is a well-design dataset for the AI approach using supervised Machine Learning algorithms to learn and test the model. The accurate classification algorithms such as SVM (Support Vector Machine), Logistics Regression, K-Nearest Neighbors or Naïve Bayes will be applied at the end of this study.

Keywords AI, Classification Algorithms, Machine Learning, Rajabhat Dataset, Skill Identification

1. Introduction

Recently, skill identification has been a crucial tool for universities to understand the quality of and to improve the students' and staff's skills [Eaves,2020]. For example, students with English skills are essential for organisations and businesses worldwide [Yang,2022]. Especially in Thailand, which is not the official language, and it is an open-door skill, employers and governments in all countries need English skills to improve their performance. VRU uses VRU-TEP (Test of English Performance) to assess students and staff in the university. It consists of Listening and Writing, but an interview does not



available on this examination. Therefore, the idea of skills identification by using AI has been applied in this study.

Recently, the Artificial Intelligence concept has been introduced in various areas, even medical or transportation, such as image recognition (protein or cancer classification), UAV (Unman Automated Vehicle), face recognition, EV Cars (Electrical Vehicles), etc. However, AI learns and predicts from the previous data; Chatbots answer human questions and predict the weather in daily life. Therefore, this study aims to apply AI in Education areas such as skill identification based on the university containing lots of information and databases.

For example, Academic Affairs services students and academic staff with tasks and contributes academic transactions to databases. Language Centre provides the VRU-TEP (Reading and Writing) English exam for students and teachers. It acts as English communication skills for them. It is fascinating to transform the data into a database and design the Rajabhat Dataset. This dataset is open to sharing and reuse with other Rajabhat Universities. Researchers or Administrators (President, Dean, or Director) assess strengths and weaknesses in their learning and teaching.

In Course designing, it needs the requirements to develop their curriculums: learning materials, teaching styles, design the assessment or evaluation method. Then, it conducts the student to learn or choose the courses based on their progression. This pain point needs Artificial Intelligence to support the algorithm of Machine Learning for accurate skill identification [Santos,2022].

University improves their performance by increasing data to manage the learning or teaching. This study's purpose is to develop a dataset for the Data-Driven approach that can use in decision-making to improve the effectiveness of instruction and student learning outcomes. For example, faculty members use it to identify the area of the curriculum and provide resources. AI monitors student progress on the Rajabhat Dataset with intervention to avoid the student falling behind. Therefore, a dataset develops from the tables or database of the Language Center and connects with the database from Academic Affairs. It is an example of interoperability between two organisations, which solves the ability to work across the organisation.

2. Research Objectives

- (1) Introduce a dataset to collect skills in the university.
- (2) Analyze the dataset with the Machine Learning algorithm in Artificial Intelligence (AI) to classify the skills.
- (3) Present this learning skills dataset to Rajabhat Dataset as the visualisation.

3. Research Methodology

Learning from data is the AI approach called "data pattern". This study uses the "Rajabhat dataset". It uses datasets for AI algorithms, Machine Learning (ML) to learn and evaluate. This help to make the data more understandable, including graphs, charts, or maps [Stephan,2022]. This research presents data with three stages: Hindsight, Insight, and Foresight. Therefore, Rajabhat Dataset introduces



the dataset template to collect and support the AI algorithms. It describes and predicts exciting or highlighting data or trends.

Design the dataset process.

The database consists of relational tables and is used to retrieve or access the data, whereas a dataset is a database. It focuses on the fields or columns from the tables. A dataset is a set of data. It is the future design or designs of the future from the existing data. It consists of columns (field of data) and rows (record of data). For example, the student record composes the student id, full name, email, address, phone, department, faculty, age, birthday, etc. School records present location, title, province, postcode, level of education, etc.

This study transforms the existing database into a learning skills dataset. It reduces the time and cost of developing the new dataset from scratch. It chooses the column as the independent variable called "feature" for learning and testing in the AI model. In addition, it extracts the crucial data, cleanses data (such as removing unnecessary records or creating new fields) and transfers it to a new dataset table or file.

*Table 1
English Skills dataset*

IDNO	FULLNAME	STATUS	MAJOR	FACULTY	PreTest	PostTest	Year	Progression
Student IDNO	Fullname of the student: firstname and lastname	Student status	Courses and major of studying	Unit/Faculty of the students	Score at the beginning of the course 3 rd year students	Score taking the exam in the 3 rd year students	Academic year	Pretest score greater than Post test

The above table interconnects with the student dataset in the Rajabhat Dataset as support information. It prepares the dataset to describe the personal background information: school, address, age, gender, etc.

Collection Process

University develops lots of tables and databases. The database supports the manipulation: retrieve, access, update, insert, or delete the information. It helps the security of the info. Recently, the application service the customer passes through the database. It describes the tasks from the transaction of the services. For example, it collects all the transactions during which students take the examination, apply to the courses, the teacher updates the grading, etc.

Collect data from the database; it depends on the among of the data. In small data, the web application collects the transaction from users. For large among of data, developers provide the API (Application Program Interface) to



automatically import data from various tables or databases such as Web applications, IoT devices, and social media (Facebook, LINE, etc.). Finally, data warehouse (Google Big Query, AWS, Snowflake, etc.) is the interoperability to integrate into the databases.

This study collects data from the database using a web application and an API connection to the organisation's databases. It is in the beginning stage of the AI dataset collection. Therefore, data cleansing is mainly a workload to prepare datasets for analysis. For example, it prepares a dataset by filling in missing values and standardisation format. In addition, Rajabhat Dataset provides storage for data collection. It locates and is free and available for every Rajabhat University member's URL:<http://www.rajabhat.net>. Otherwise, google sheets are also available for storage and sharing with the Rajabhat Dataset.

Analyse Process

Measure the effectiveness of the identification of the skill in education. This is the primary process of this study. Typically, AI uses a dataset that is already clean to use by identifying and removing unnecessary fields. It looks for the independent variable called "features" that impact the results or "class". For example, the school affects the English score of the students. The major of studying presents the score from other majors. Classes for communication skills offer presence or absence. It uses Machine Learning to identify the accurate values from learning and testing clusters.

Usually, the algorithms are divided into two different methods: classification and regression. It chooses the best algorithms to find accurate data patterns. Various algorithms are suitable for multiple problems. Especially the size of the dataset is the number of rows and columns in the dataset. Rows present the volume used for training and testing the results(classes). Columns are the effecting fields of the results. According to the different abilities of Machine Learning algorithms, this study uses the supervised machine learning algorithms to find the right skills dataset. Then, it presents the algorithms' CA (Correct Accurate values of the predictions).

Visualise Process

This study uses Google Data Studio as a tool to represent the graphs and charts. Next, it makes the three different sights of the information: Hindsight, Insight, and Foresight. Finally, it finds paint points for identifying the skills of the students and staff.

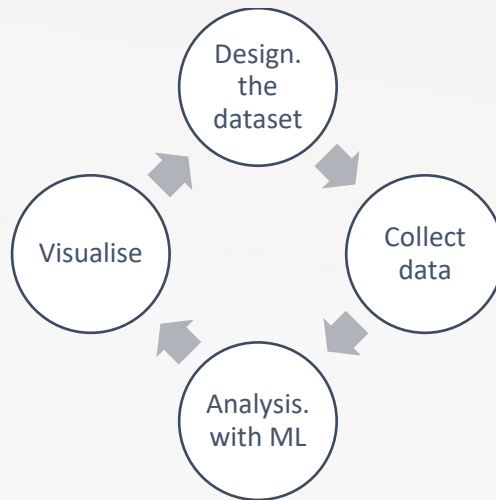


Figure 1 Learning skills dataset in Rajabhat Dataset with AI

This study aims to use data from Rajabhat Dataset and collaborate with the existing databases in the university. It proposes a new dataset for describing the English skills that predict talent identification. AI uses a Machine Learning algorithm to classify the dataset and presents visualisation in the following figure [Yazan,2021].

Foresight is the ability to predict and understand how long the results take. However, insight describes understanding or perception of the event from situations and problems [Ternikov,2022]. It is different from hindsight, that understanding after it occurred. It learns from experiences. Then it gives a better understanding of the data. In summary, foresight and insight understand the future, whereas hindsight understands the past. This is the reason for using three bases of visualisations in the Rajabhat Dataset.

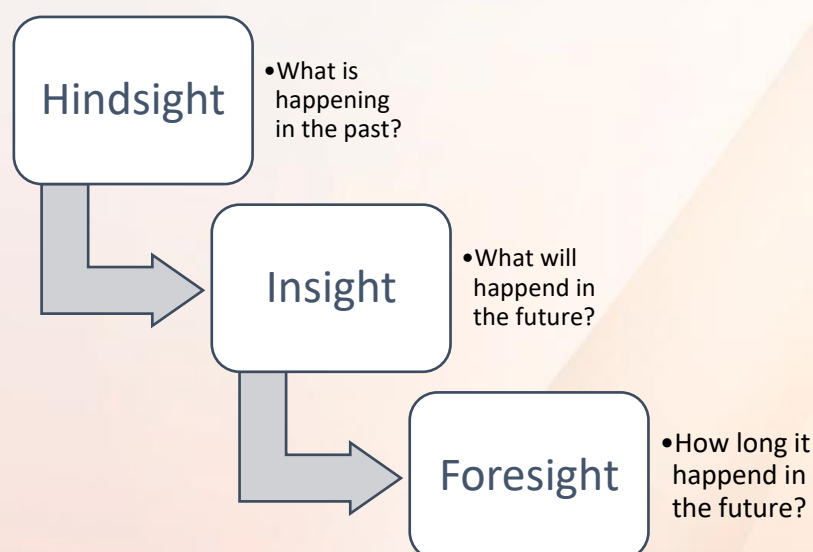


Figure 2 Basis of Visualization



AI uses Machine Learning algorithms to find the prediction results call "class". Then, it must find the appropriate variables or "features" that impact the prediction. Therefore, it requires the process to analyse convenient features as follows.

Features Analysis

This is the process of using Machine Learning to find the essential features in the algorithms. For example, figure 3 presents all the features of the VRU-TEP.

Feature Statistics								
Name	Distribution	Mean	Median	Dispersion	Min.	Max.	Missing	
PreTest		29.97	28	0.30	7	93	1924 (17 %)	
Post Test		36.61	34	0.34	9	91	5941 (53 %)	
Year		2561.63	2561	0	2559	2565	0 (0 %)	
MAJOR			รัฐประศาสนศา...	3.87			0 (0 %)	
FACULTY			มนุษยศาสตร์น...	1.85			0 (0 %)	
Progression			UP	0.664			0 (0 %)	
Results			Absence	0.487			0 (0 %)	

Figure 3 Feature Analysis to find the convenient feature for the algorithm.

This figure begins with VRU-TEP dataset loading for feature analysis and choosing 70% of the dataset for training the model and the last 30% for evaluating the model. Then, it uses the supervised machine learning algorithms: Naïve Bayes, SVM, Logistic Regression and KNN to be applied in AI analysis [Saraswathi,2022].

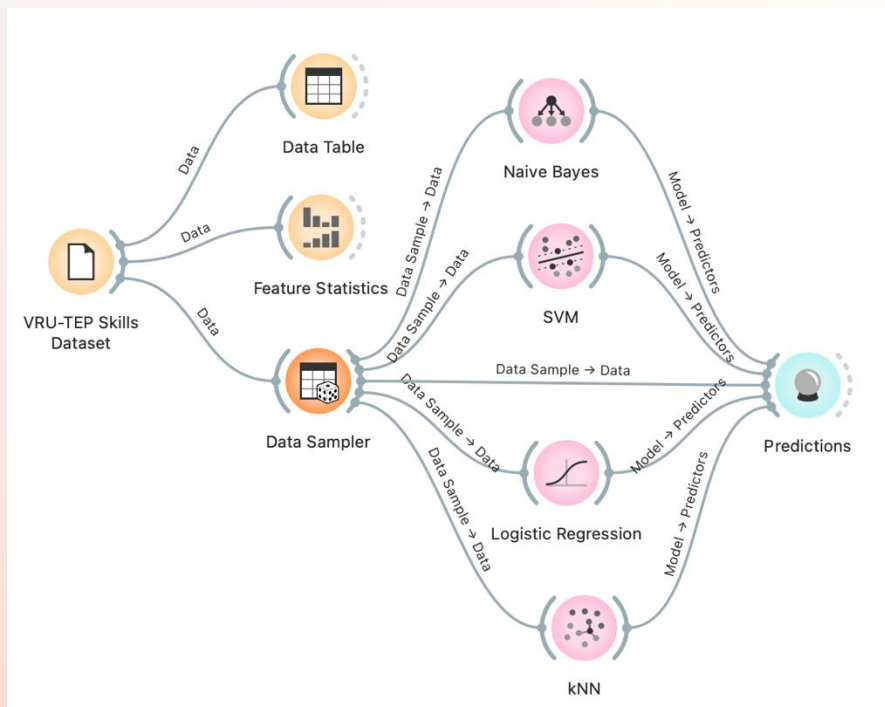


Figure 4 the supervised Machine Learning algorithms

Machine Learning Algorithms (ML)

According to the type of AI learning, ML notify into three different educations: supervised (label data), unsupervised (unlabeled data) and reinforcement learning. This study uses supervised learning to find relevant information for the prediction. First, it designs an English skills dataset to describe the skills from third-year students' examinations. These are the supervised Machine Learning algorithms used to find the prediction [Yildiz,2022]. It uses to classify the presence and absence of students each year, which is necessary for the administrators to manage the English skills in the university.

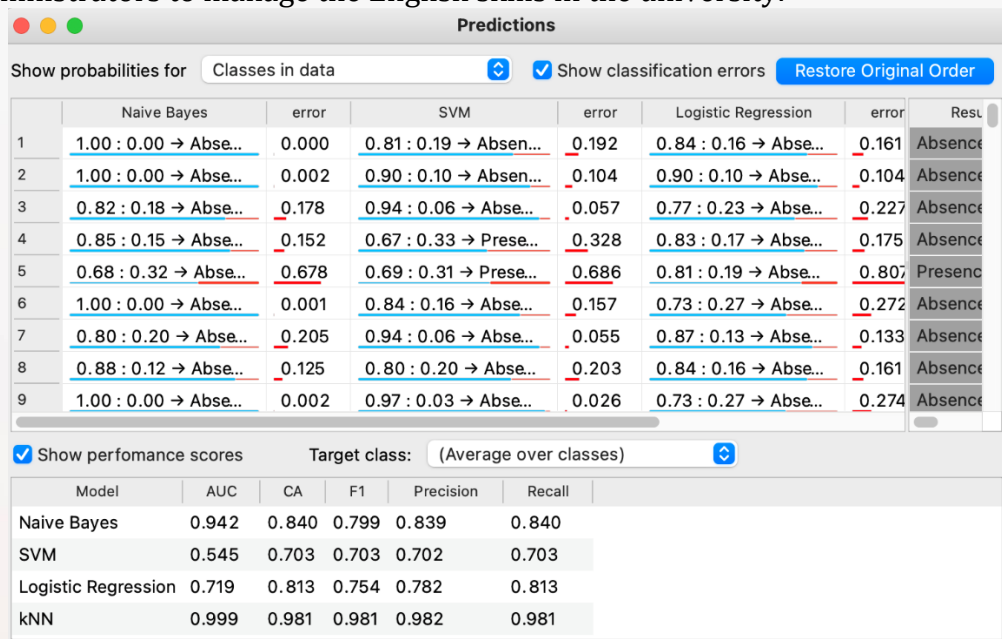


Figure 5 Prediction with the supervised machine learning algorithms.

CA is the cluster accuracy value between 0 and 1, with the height values representing the high performance of the algorithms [Wu,2020].

Logistics Regression

It uses one or more independent variables and uses them for classification algorithms. This works on the binary values, and the results present Yes/No as a binary training classifier. For example, how can we know presence or absence? CA value is "0.813", that good for using this algorithm for prediction on the data model.

K-Nearest Neighbors (KNN)

It defines the "K" point, and the class is the nearest training with this point [Al-Taani,2022]. It is suitable for the small dataset and uses approximate values to classify the group of datasets. It gets a CA value of "0.981", the highest performance algorithm for this dataset.



Naïve Bayes

It assumes that the presence of features in the class and unrelated to other presence features. This algorithm is suitable for text classification, such as spam detection or image recognition and needs a large amount of data to manipulate. CA value is "0.840", that also suitable for using this dataset.

SVM (Support Vector Machine)

This algorithm is suitable for the classification algorithm, which presents the hyperplane (maximum margin) to divide the cluster into the data. It uses in hypertext categorisation and bioinformatics (protein or cancer classification). CA value is "0.703", which might be a good choice for this dataset.

4. Research Results

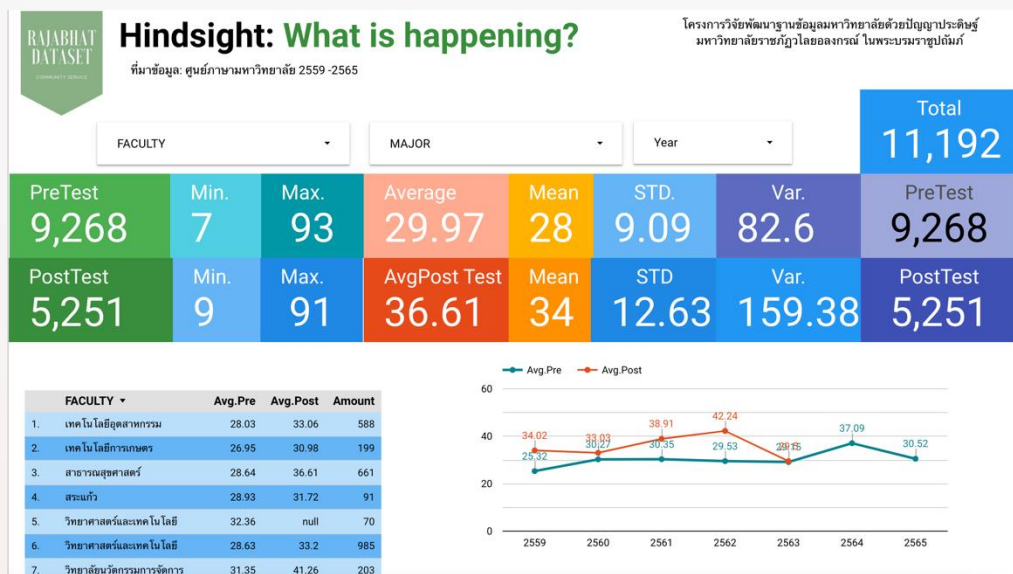


Figure 6 Hindsight of English Score

Hindsight learns from past experiences. This study narrows down with analysis of the data in various dimensions: location, school, faculty, courses, grading, gender, etc. This uses to identify the strengths and weaknesses of personal learning. Categories of the data are essential for finding the impact features. It identifies all the relation or dependent variables and transfers them to independent variables. Recently, the visualisation presented the qualification of each faculty and department.

It needs more information to identify the individual abilities. The figure shows the English skills information with Min, Max, Average, Mean, Standard Deviation, etc., with 11,192 students. The average PreTest(9,268 students) score is 29.97, and PostTest (5,251 students) score is 36.61. However, faculty members are concerned about increasing the PostTest numbers to track the skills results from every department or significant. However, the PreTest maximum is 93,



whereas the PostTest maximum is 91, but the average PostTest score is above the Pretest score.

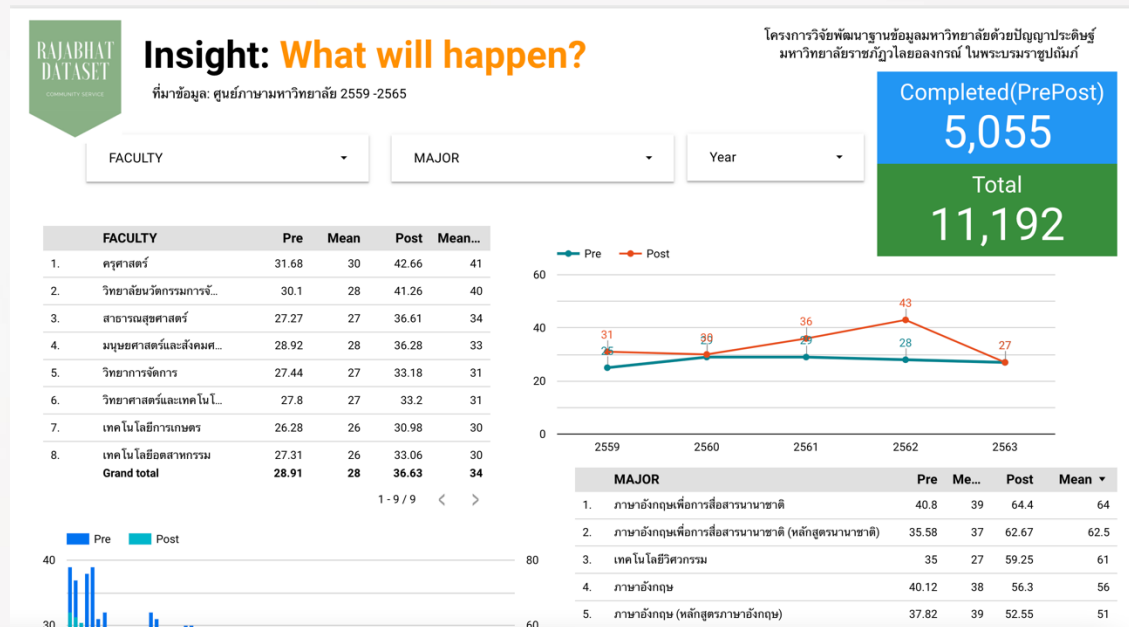


Figure 7 Insight of English Score

Faculty of Education gets the highest PreTest and PostTest score with the International English courses with tiny above the mean values. The trends of the scores are slightly decreasing every year. This requires improving every faculty's English learning and training [Yang,2022].

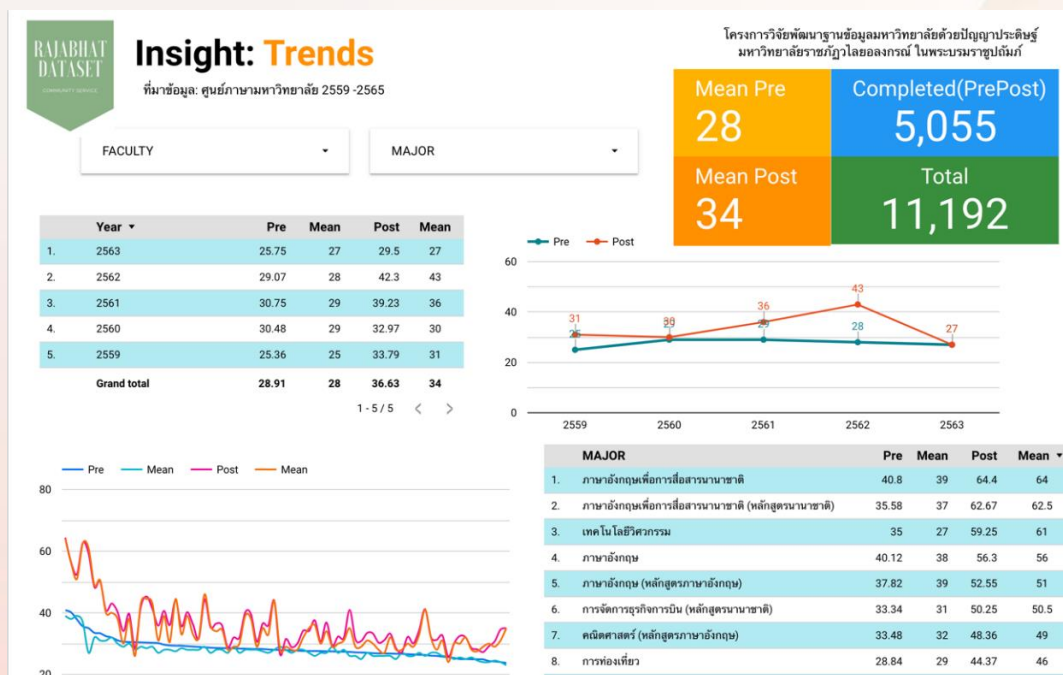




Figure 8 Insight Trends of English Score

In these results, the score presents differently from the faculty and score dimension. The presence of the students compares with Pre-exam, Post-exam and mean. Trends in English skills from different faculty and departments predict tread for market opportunity. This is very important for university or faculty members to manage their quality of English skills. It needs to prepare the students with resources and training for a further score. The teaching style needs to change or open more thorough training for absent students. Keep the presence of students in an English environment to use more English.

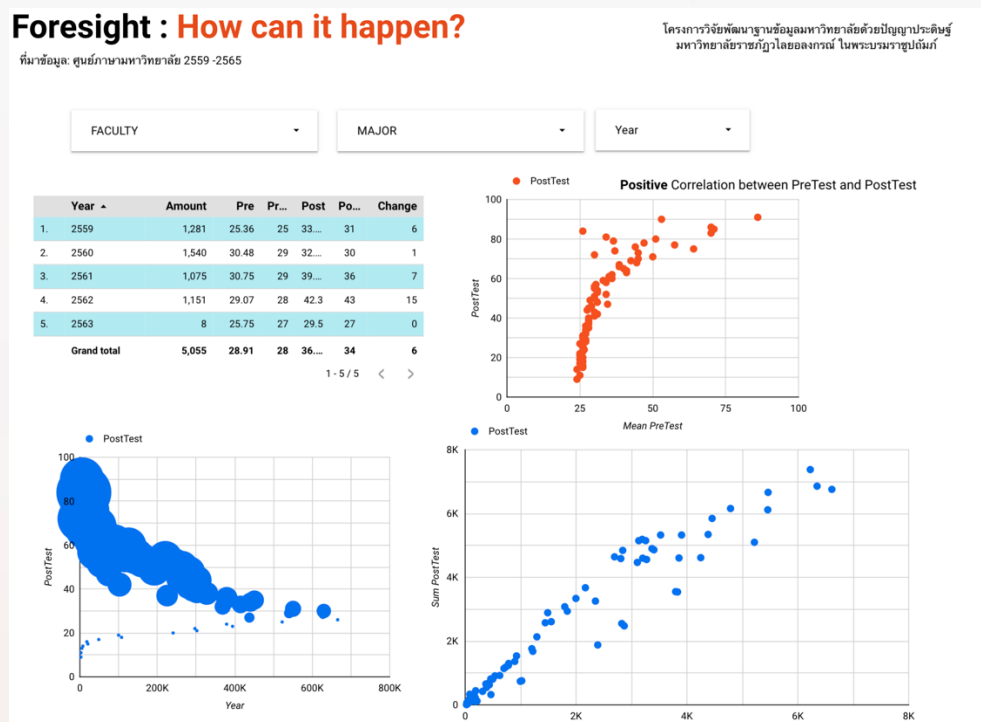


Figure 9 Foresight of English Skills

Foresight presents present the scatter graph from different situations. University uses to identify which faculty or department increases their presence and decreases the absence of their English skills. How long it takes for this situation? Training and resourcing of the English based on the individual tasks. The scatter graphs it classifies the presence and absence of learning groups.

5. Discussion

This study proposes the skills dataset for classifying and predicting skill identification. In the beginning stage, it chooses English skills as an example of communication skills. However, the comparison between ML algorithms used to describe the data patterns found the problem of data cleansing to complete the dataset for analysis with AI. Therefore, Rajabhat University needs its existing database and transforms it into the dataset as the Rajabhat Dataset. This is open data that share and reused with other universities.



Training Courses and materials support and increase the skills. The collaboration between Language Centre, Library or Academic Resource and Information Technology (ARIT), and faculty members provide the university's learning environment based on students' presence and absence.

Background knowledge, such as location and school students, will be analysed in the correlations. University provides the learning/teaching for the teachers from the schools as the academic services. With the limitation of the budget, it is not only community support but also opens the opportunity for university marketing.

6. Conclusion

Finally, the skills dataset component is designed as part of the Rajabhat Dataset. It uses to support Machine Learning algorithms to find accurate identification. The ML algorithm's accuracy represents the best solution for classifying the English skills: presence or absence. However, communication skills also need to use not only in writing and reading skills but also needs conversation skills. Collecting many data is the reason for using AI to classify student skills and identify the university's skills. Various analyses, such as school-based and location-based, are applied to identify the skills of the individual students. AI presents skills identification by providing suitable courses for the right person. Therefore, it reduces the time and cost of the learning and teaching environment in the university.

7. Recommendation

In the future, a university needs information to drive courses based on the market and the requirements as a Data-Driven university. This example, English skills, is an example of a provision that famous require for every company or job. The presence and absence of students indicate the success of the university language curriculum and challenge the university where to improve the quality of teachers, students, and resources. However, skills identification also needs many features (impact information to the results) and provides suitable training courses and teaching styles with AI classifying their skills.

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Optimization Cutting Tool Cost Down

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Abstract

The research aims to reduce the cost of the toll cylinder Internal grinding bush and increase production from the use of new tools. Tested on specimens 1 to 200, collecting data in all three periods: beginning, middle and end. From Tool Mizuho, it was originally able to produce 2,400 work PCS/Unit, representing a cost of 0.89 THB/Unit. Using tool Maker Xinlun, the performance is similar to Tool Mizuho, the ability to produce 4,800 work PCS/Unit, costing 0.56 THB/Unit, cost savings 0.33 THB/Unit, representing 346,168 THB/year. The experiment found that tool Maker Xinlun has performance Ability to produce workpieces 14,286, representing a cost of 0.19 THB/Unit, can reduce costs by 0.70 THB/Unit, representing 738,333 THB/year.

Keyword: Optimization, Cutting Tool, Cost Down, Current, Plan New

1.Introduction

Industry in Thailand has developed including the technology used. In the production of products has been continuously developed. At present, Thailand can produce almost all kinds of high-quality products for the world market and the conditions of the industry have to fight and compete in the market. Both the quality and price of this product. causing manufacturers to use machines and modern technology and has a longer service life.

Reducing the cost of production is of great importance in this area. Due to the conditions of intense price competition, production costs are high. Therefore, there must be a reduction in production costs. It starts from reducing the cost of raw materials in the part of grinding stones that are procured to be used to produce compressor parts. The manufacturing company has introduced grinding stones of various companies. Let's experiment to find the difference in quality and price. In order to meet the satisfaction, it creates a commercial opportunity to be a continuous supplier of compressor parts in the future. Factories that focus on defects or budget for high prevention costs. This will result in the cost of quality inspection, measurement and assessment. internal defect cost Cost of external quality defects There is a low cost (Prasit Soontrarak, 2008).

The quality cost structure can be divided into 2 types: Direct Quality Cost and Indirect Quality Cost. For organizations with low audit costs, measurement costs, and Appraisal Costs and Prevention Costs), it results in high Total Costs of Quality from the results obtained from the analysis to improve processes and reduce quality costs. By various types, and the results obtained from the data analysis are used to increase or decrease. Quality cost activities by category



enumerated in each process to want the cost Total quality dropped to the lowest (Lersak Dantrakul, 2017).

The researcher therefore studied the internal grinding bush used in the cylinder production process compressor components. The tool life of the Maker Mizuho series was found to be short and costly. Tool Maker Xinlun, which has a lower cost, was considered and studied to test its tool life performance. To increase productivity (On-Uma Kosnan et al, 2008) and reduce costs, reduce grinding stone costs for the company.

2.Research Objective.

1. To reduce the cost of the toll cylinder Internal grinding bush.
2. To increase production from the use of new tools.

3.Research Methodology

Experimental design of the original and the new. The grinding stone has a full size of 9.50 mm. Expires at 8.00 mm. Measured every 10 workpieces tested.

1.Keep Data current tool

Use the old grinding wheel. Tested on specimens 1 to 200, collecting data in all three periods: beginning, middle and end.

2.Trial & keep Data new tool

Uses a new grinding wheel. Tested on specimens 1 to 200, collecting data in all three periods: beginning, middle and end.

*Table 1
specification of grindstones that can be compared as follows*

Detial	Current	Plan New
Tool Space	PBT 220 L C180 VGA52	CBN 200 M 200V
Dimensions	D.9.5*16*M14	D.9.5*16*M14
Maker	Mizuho	Xinlun
Tool life (Pcs)	2,400	4,800
Price (THB)	5,627	3,400
Restone (time)	4	4
Restone Price (THB)	1,250	2,500
Cost (THB/Unit)	0.89	0.56
Cost down (THB/Unit)	0.33	
Production plan (Unit/Year)	1,057,809	
Cost down (THB/Year)	346,168	

From Table 1 show estimated that the cost can be reduced by 0.56 THB/Unit from the original 0.89 THB/Unit, which can reduce the cost for the company by 0.33 THB/Unit or equivalent to 346,168 THB/year, the lifetime of the Maker. Xinlun is equal to this 4,800 pcs.



4. Research Results

The experimental results are as follows.

1. Roughness measurement

Table 2
Roughness measurement

No.	Roughness S side STD 0.3 (Ra.)	Roughness D side STD 0.3 (Ra.)
1	0.10	0.10
10	0.14	0.14
20	0.16	0.15
30	0.17	0.17
40	0.17	0.19
50	0.18	0.16
60	0.19	0.20
70	0.22	0.22
80	0.21	0.21
90	0.23	0.23
100	0.23	0.24
110	0.25	0.25
120	0.24	0.25
130	0.25	0.24
140	0.24	0.25
150	0.26	0.25
160	0.26	0.25
170	0.25	0.24
180	0.27	0.28
190	0.25	0.25
200	0.26	0.26

Roughness value

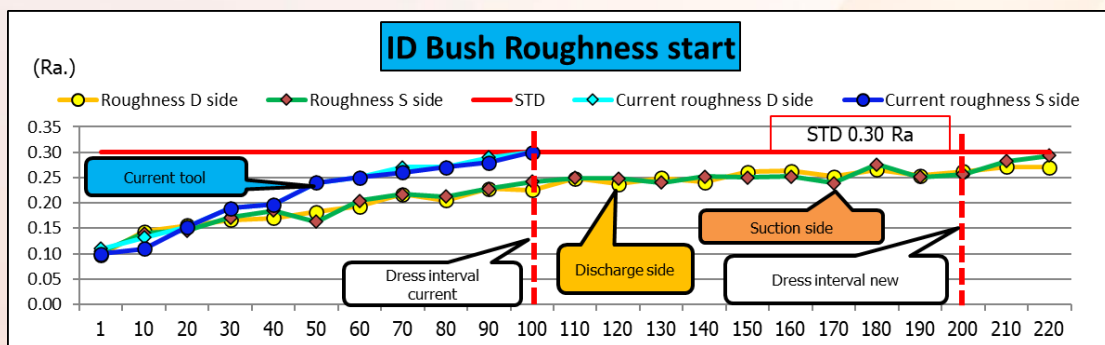


Figure 1 shows the initial Roughness graph.

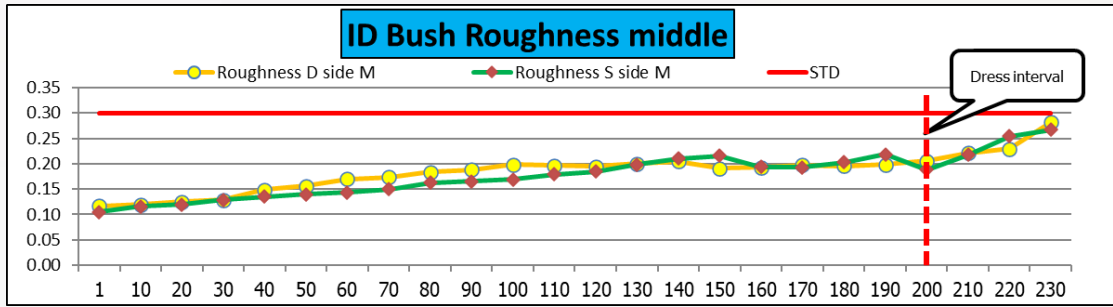


Figure 2 shows a medium-sized Roughness graph.

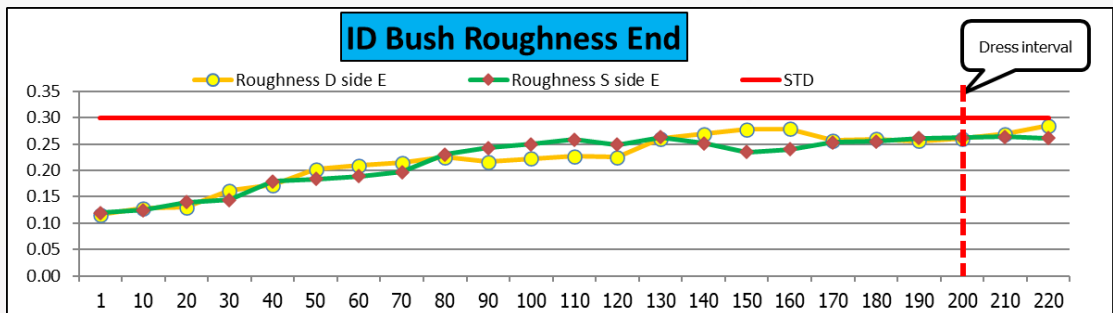


Figure 3 shows the final size Rounghness graph.

2. Information of New Grinding Wheel (Xinlun)

Data Start New tool dimeter at the head, middle and end using a micrometer measuring tool.

Table 3

Data Start Size of the new tool at the head, middle and end.

No.	Point			
	1(mm.)	2(mm.)	3(mm.)	Taper
1	9.403	9.404	9.404	0.001
50	9.402	9.402	9.403	0.001
100	9.399	9.401	9.402	0.003
150	9.398	9.4	9.401	0.003
200	9.397	9.399	9.4	0.003

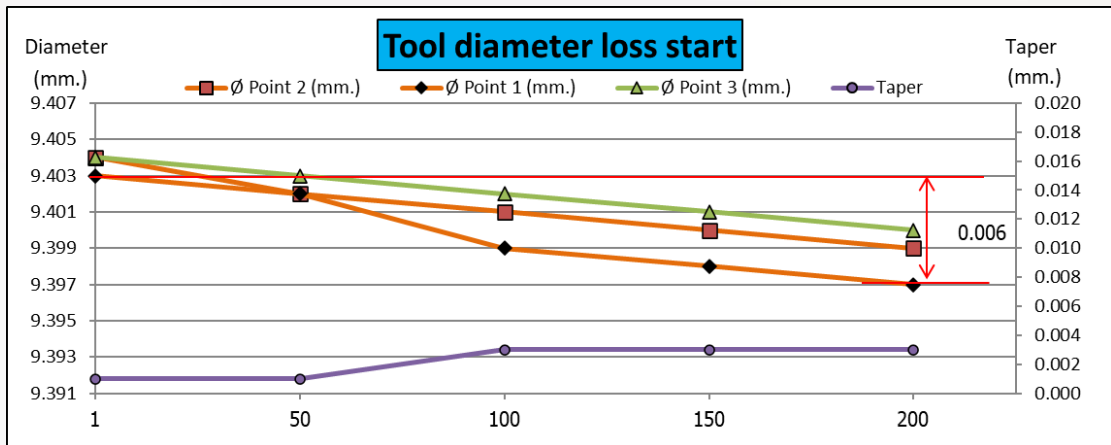


Figure 4 Graph showing Data Start, size of new tool at head, middle and end.

Table 4
Data Middle Size of the new tool at the head, middle and end.

No.	Point			
	1(mm.)	2(mm.)	3(mm.)	Taper
1	8.85	8.851	8.851	0.001
50	8.847	8.848	8.849	0.002
100	8.846	8.846	8.848	0.002
150	8.845	8.846	8.847	0.002
200	8.843	8.844	8.845	0.002

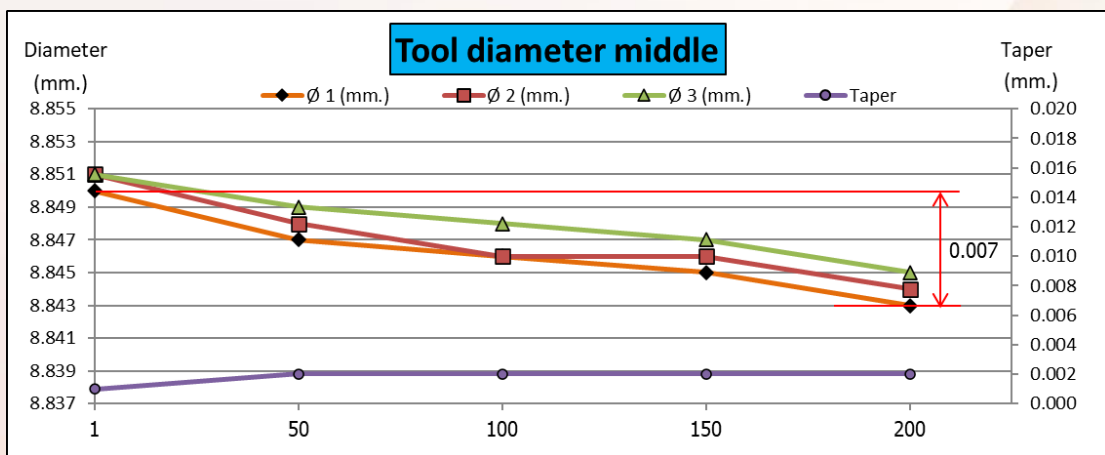


Figure 5 Graph showing Data Middle, size of new tool at head, middle and end.



Table 5
Data end Size of the new tool at the head, middle and end.

No.	Point			
	1(mm.)	2(mm.)	3(mm.)	Taper
1	8.071	8.072	8.072	0.001
50	8.067	8.068	8.07	0.003
100	8.067	8.068	8.07	0.003
150	8.065	8.066	8.067	0.002
200	8.065	8.065	8.067	0.002

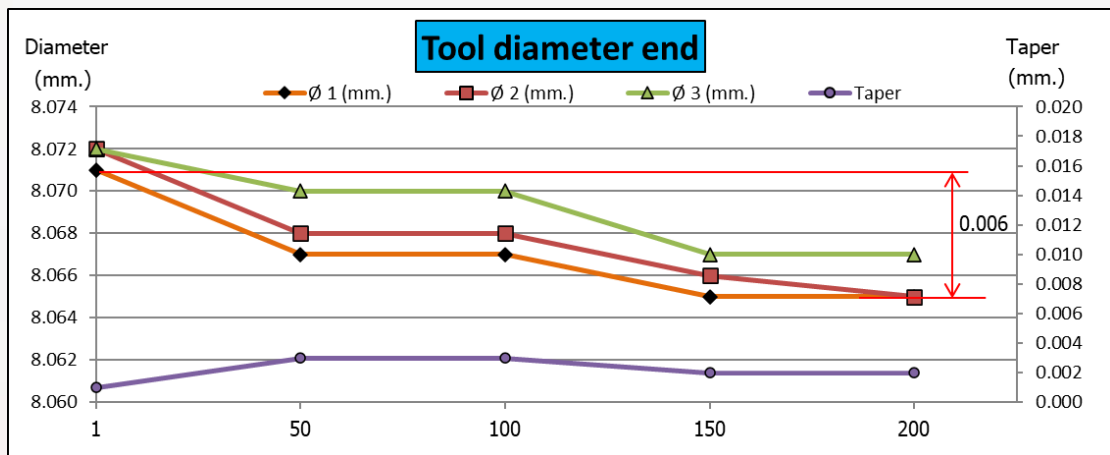


Figure 6 Graph showing Data end, size of new tool at head, middle and end.

5. Discussion

Analyze operations

From the trial operation of the new Xinlun brand tool to compare the quality according to the company's standards to increase production efficiency and reduce costs as follows.

Table 6
Cost table/unit of each Maker

Maker	Tool Life	Price	Cost/Unit
Mizuho	2,400	5,627	0.89
Xinlun	14,286	3,400	0.19

From the cost table 6 of buying grinding stones per year It can cost 0.19 THB/Unit from the original 0.89 THB/Unit. It can reduce the cost for the company by 0.70 THB/Unit or 738,333 THB/year. Maker Xinlun's lifespan is 14,286 pcs.



Table 7
Comparison Table of Grindstones

Detail	Current	New
Tool Space	PBT 220 L C180 VGA52	CBN 200 M 200V
Dimensions	D.9.5*16*M14	D.9.5*16*M14
Maker	Mizuho	Xinlun
Tool life (Pcs)	2,400	14,286
Price (THB)	5,627	3,400
Restone (time)	4	4
Restone Price (THB)	1,250	2,500
Cost (THB/Unit)	0.89	0.19
Cost down (THB/Unit)	0.70	
Production plan (Unit/Year)	1,057,809	
Cost down (THB/Year)	738,333	

From the specification table of the specified grindstones can be compared from the actual experiment. 0.19 THB/Unit from the original cost reduction target of 0.56 THB/Unit can reduce the planned cost by 0.37 THB/Unit.

6. Conclusion

Performance Summary

The research team has been working to reduce the cost of grinding stones. By applying management principles to achieve maximum efficiency, lowest cost. To increase productivity, it can be used to analyze problems in reducing costs (Polwat Chinnawong, 2021) as follows:

1. From the test, use a new tool to grind the job. As a result, the new tool life is 2,400 more than the old tool life. The new tool life is 14,286 more than the original tool life of 4,800 pcs.

2. The performance of the new tool is close to that of the old tool. after the test until the job non-standard Gives results close to the original tool.

3. Reduce the dressing time from 100 stone dressing 1 time to 200 stone dressing 1 time, increasing work efficiency.

So, it can be concluded that the new tool is more efficient than the old tool. Due to the longer service life, the workpiece can be produced in more and can reduce costs for the company according to the objectives When surveying the cost of buying grinding stones per year It can cost 0.19 THB/Unit from 0.89 THB/Unit. It can reduce the cost for the company by 0.70 THB/Unit or 738,333 THB/year. The useful life of Maker Xinlun is 14,286 pcs.



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Study of Thread Screw Pitch range on Stress of Lumbar Spine

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Abstract

Spine surgery is a very important treatment for human who got bone fracture and disease. The treatment needs screws to fix the spine in order to treat spinal injury whether it is the result of an accident, growing older, tuberculosis of musculoskeletal system. After treatment some of patients has a problem about a loosen screw. This problem can be solved only by replacing new screws. Therefore, KJ Chomphuphan Medical CO., LTD. has a topic that is interested in testing the increase in pitch range of screws attached to the cortical bone in order to test its effect to the cortical bone. The topic is interested to find the clamping capacity of screw with longer pitch by the fine pitch increments of 2 mm. up to half of the total range of a 6.5x40 mm. dual thread screw. the researcher created a model of a bone fixed by a screw which is an experimental sample and analyzed it by Solidworks program. To test the stress through Solidworks simulation. The result found that increasing the range of fine pitch to 20 mm. provide the lowest stress when considering only the pedicle and cortical bone.

Keyword: Cortical bone, Spine, Finite element analysis, Stress, Spine surgery

1. Introduction

The spine is a crucial component of human body, that contains nerves, intervertebral discs, and it is connected with numerous vital organs that are necessary for maintaining human life. If the spine got some injury or bone related diseases, immediate treatment will be required. In some cases, spinal surgery requires the use of screws to fix the spine in order to treat spinal injury whether it is the result of an accident, growing older, tuberculosis of musculoskeletal system, or bone cancer which can be found in a large numbers. This kind of treatment requires the use of screws to fix the bone to the spine and welding each screw with titanium metal wire. In order to alleviate these symptoms and reinforce the spine so that the patient can lead a sustainable life. The size and number of screws used in each case depends on the size of patient's spine and the number of damaged bones.

The structure of each spine attached to the screw consists of three components: pedicle, cortical and spongy bone as shown in fig 1. Spinal fixation surgery is performed by fixing the screw to the level of spongy bone which is a part of the bone that is porous like a sponge. The procedure of each screw that is attached to the bone has a different pitch of thread. The pedicle area has a finer pitch than spongy bone area as shown in fig 2. As a result, KJ Chomphuphan



Medical CO., LTD. is interested in studying the increase of screw pitch of thread and fixation on the cortical bone in a greater proportion. Since the bone in this area has the same properties as the pedicle area, so does increasing the range of the fine pitch screw will made the screw have better clamping force? and can the burden of the bone in that area be reduced to prevent the screws from loosening in patients?

One of most common problems in spinal surgery is “screw loosening condition” which can only be solved by replacing new screws. Therefore, KJ Chomphuphan Medical CO., LTD. is interested in testing the increase in pitch range of screws attached to the cortical bone in order to test its effect to the cortical bone. The company wants to know the clamping capacity of screw with longer pitch by the fine pitch increments of 2 mm up to half of the total range of a 6.5x40 mm dual thread screw.

The screw loosening is usually caused by damage to the bone that fixed to the screw threads. So, to analyze the clamping capacity of the screw, the researcher created a model of a bone fixed by a screw which is an experimental sample and analyzed it by Solidworks program. The test of stress through Solidworks simulation in order to apply this knowledge and information to the treatment of patients who need spinal surgery and prevent the loosening screw in patients from now on.

2. Research Objective.

1. To study effect of the fine pitch rang on the stress of bone that was contacted.
2. To determine the fine pitch rang that less effect to bone stress.

3. Research Methodology

3.1 Model

A 3D model was created by Solidworks program, which created the bone area that attached with the screw as shown in fig 1. The proportion of fine pitch in the experiment is shown in Table 1. The bone that excised by the screw is shown in fig 2. The model is based on the assumption and data of KJ Chomphuphan Medical CO., LTD. The bone that is attached to the screw usually consists of the pedicle, cortical and spongy bone which the characteristic of the screw attachment is shown in fig 3. The study of this model was performed by simulating the bone in pedicle and cortical bone area, where the thickness of pedicle is 10 mm and the thickness of cortical is 10 mm. In general, the fine pitch of a screw is fixed only to the pedicle area, not to the cortical. Due to the properties of the cortical are similar with the pedicle, so the thickness of the model is 20 mm. The material properties of cortical bone are shown in table 2 (Kelly, 2009; Jorge, 2018; Quentin, 2019; Shahar, 2007; Yu-Shu Lai, 2015; Jongwon Lee, 2011)

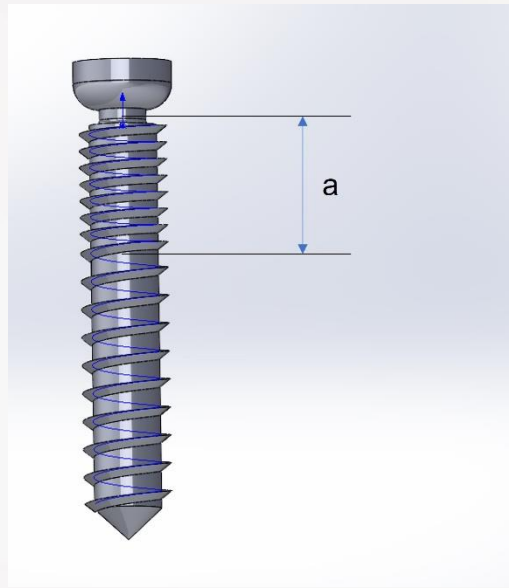
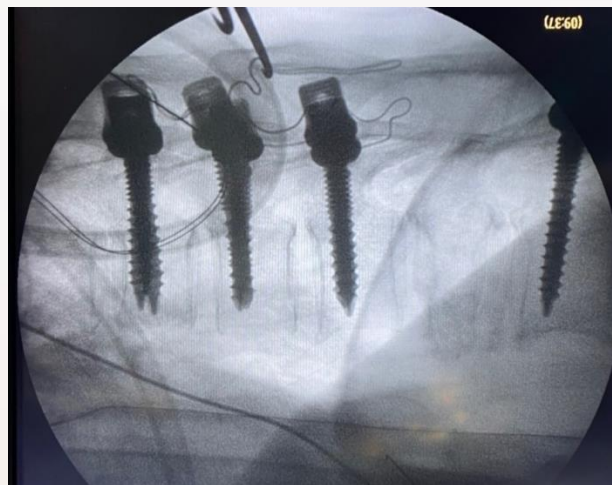
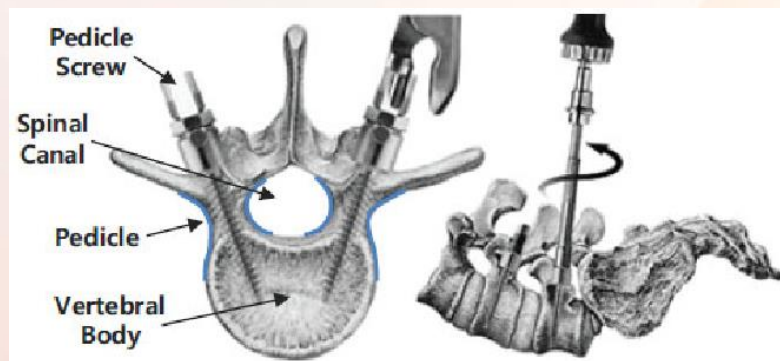


Figure 1 screw model



(a)



(b)

Figure 2 Screw position in surgical spine (Jongwon Lee, 2011).



Table 1 Research conditions

Case	Fine pitch range (mm.)
Case 1	12
Case 2	14
Case 3	16
Case 4	18
Case 5	20

Table 2 Material properties of Cortical bone. (Tension)

properties	value	unit
Elastic Modulus	1.7×10^{10}	N/m ²
Poisson's ratio	0.3	-
Mass Density	1600	Kg/m ³
Tensiles Strength	5.2×10^7	N/m ²
Compressive Strength	1.53×10^8	N/m ²
Yield Strength	1.51×10^8	N/m ²

3.2 Experimental set up

The 3D model will be analyzed for stress by using Finite element analysis through Solidworks simulation (Pramote Dechaumphai, 2013), according to the information received from KJ Chomphuphan Medical CO., LTD., indicating that the weight applied on the screw in this section is 15 kg., the tension will damage the bone causing the screw to loosen. Therefore, the bone model analyzed the tension exerted on the bone from the screw thread. The green arrow is the anchor, which is the inner surface of the cortical bone. The pink ones is the force acting on the bone through the spiral in the form of stretching to test the Von mises stress in the mentioned area. The experimental set up is shown in the fig 3.

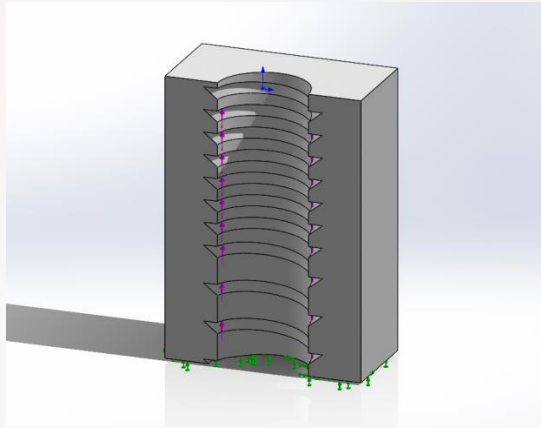
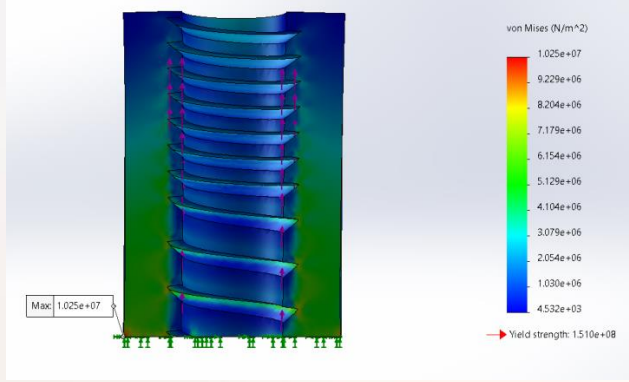


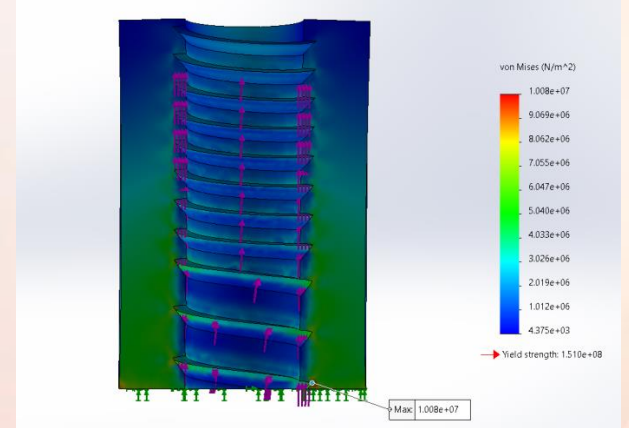
Figure 3 cortical bone condition set up.

4. Research Results

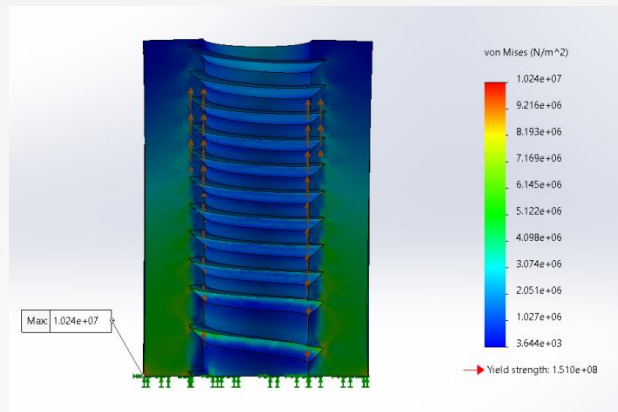
Due to the experimental results, found that when the fine pitch of thread increased within the range of 12-18 mm. with the maximum stress, Von mises stress reveal similar result with no significant difference which are 1.03×10^7 , 1.01×10^7 , 1.02×10^7 and 1.01×10^7 N/m² for fine pitch at 12, 14, 16, and 18 mm. respectively. However, the case of 20 mm. the stress reduces obviously at 9.46×10^6 N/m² as shown in figure 4 (a – e) and fig 5.



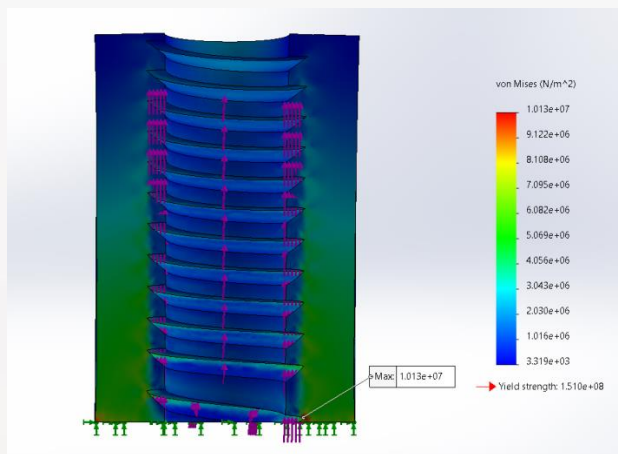
(a) Fine pitch range 12 mm. (1.03×10^7 N/m²)



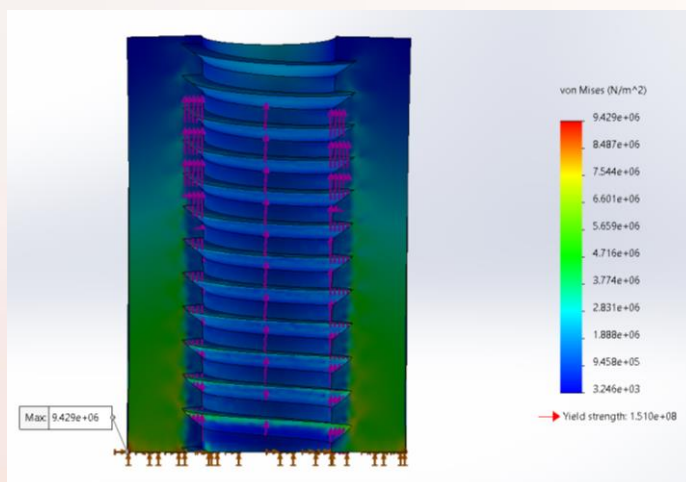
(b) Fine pitch range 14 mm. (1.01×10^7 N/m²)



(c) Fine pitch range 16 mm. ($1.02 \times 10^7 \text{ N/m}^2$)



(d) Fine pitch range 18 mm. ($1.01 \times 10^7 \text{ N/m}^2$)



(e) Fine pitch range 20 mm. ($9.46 \times 10^6 \text{ N/m}^2$)

Figure 4 Von mises stress for each condition

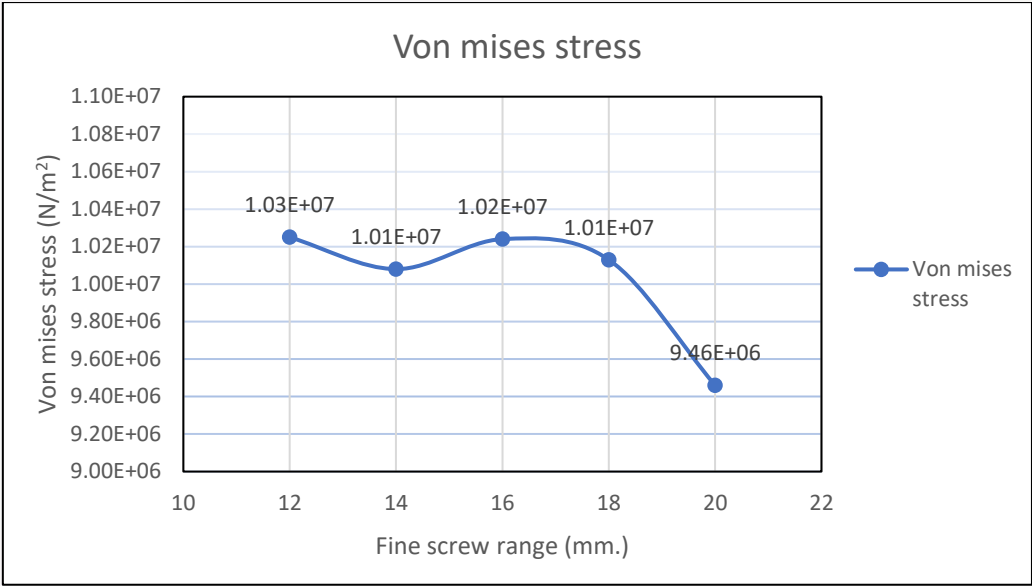
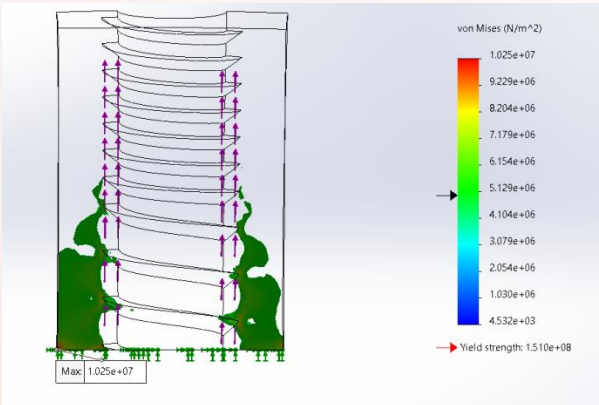
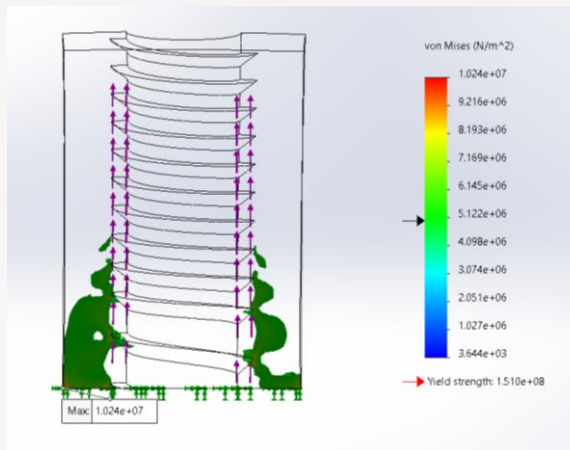


Figure 5 Von mises stress for each condition

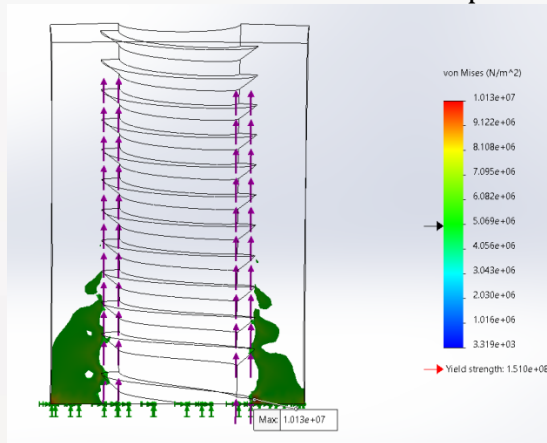
From the experimental results in fig 4 can be observed that in high stress area is gradually move downwards along the y-axis (vertical) from top to bottom when the range of fine pitch gradually increases from top to bottom as well. The green area of the wide pitch represented higher stress than the fine pitch in blue area. In addition, it can also observe from the Von mises stress at half of the maximum stress at approximately 5.00×10^6 , that usually occurs near the thread with wide pitch range as shown in fig 6. It can be indicated that increasing the range of fine pitch effects to reduce the bone stress in that area and the distribution of the bone stress too.



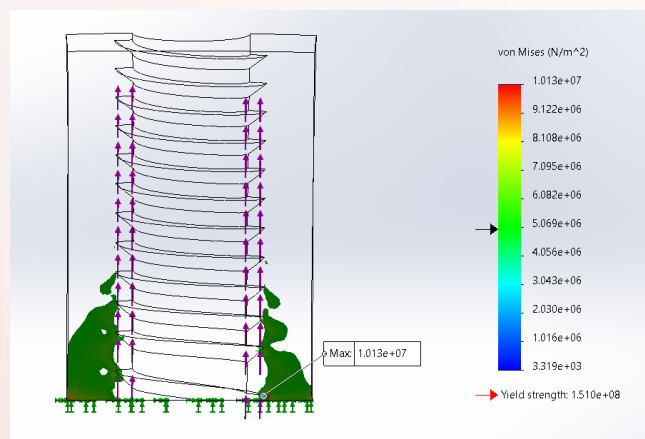
(a) stress distribution of cortical bone for fine pitch range 12 mm.



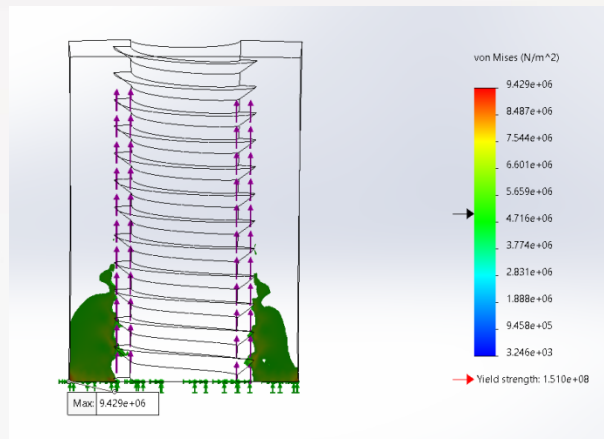
(b) stress distribution of cortical bone for fine pitch range 14 mm.



(c) stress distribution of cortical bone for fine pitch range 16 mm.



(d) stress distribution of cortical bone for fine pitch range 18 mm.



(e) stress distribution of cortical bone for fine pitch range 20 mm.

Figure 6 Von mises stress distribution in cortical bone.

5. Discussion

According to the experimental results, increasing the fine pitch range of the screw effects the distribution of Von mises stress inside the bone that fixed with the screw also change. That is to say, the bone attached with fine pitch have less stress than the area that attached with wide pitch. So, increasing the thread ratio with finer pitch will lead to the stress reduction of the clamped area, when the case that maximum stress value is the least at 20 mm which the fine thread accounts for half of the total length. It can be seen from fig 6 that consider only the stress value greater than 5.0×10^7 N/m² which more than half of maximum stress occurred at the lower edge of the model around junction area of cortical and spongy bone. It was found that the stress greater than 5.0×10^7 N/m² is distribute in the wide pitch area because the area of the bone fixes with the screw is smaller than the area fixed with fine pitch. As a result, the stress has a inverse variation with loading area, so the smaller loading area get higher stress when it receive the same force. However, the case of minimum bone stress is the case of fine pitch at 20 mm.

6. Conclusion

The experimental results revealed that the analysis of bone stress by using finite element analysis found that in that case analyzed only in the pedicle and cortical sections, increasing the fine pitch is 12, 14, 16, 18, and 20 mm. resulted in a decrease of the maximum Von mises stress in the 20 mm case only. In the other cases, the value of maximum stress is quite similar. When considering the stress distribution inside the bone model shown that the bone that is fixed with fine pitch have lower stress than wide pitch.

Therefore, under the limitations and conditions of KJ Chomphuphan Medical CO., LTD., increasing the range of the fine pitch is able to solve the problem of screw loosening cause by the stress distribution on the bone around the thread that have lower fine pitch range that fixed with wide pitch. It also indicates that



the damage at that area will reduce, so increasing the range of fine pitch to 20 mm. provide the lowest stress when considering only the pedicle and cortical bone.

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Increase Efficiency Cutting PIPE Process

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Abstract

This research aims to study the waste occurring in the pipe cutting process and increase the efficiency of PIPE cutting by applying the Lean concept. Research tools by Flow process chart, applying the principle ECRS helps in eliminating waste in the process and layout of production for better work flow. In all 4 processes, research on the PIPE cutting process has been found to reduce distances from 463 meters to 113 meters, decreased by 350, representing 75.59%, reducing the duration from 319 minutes to 246 minutes, reducing 73 minutes, representing 22.88% reducing steps from 16 to 9, reducing 5 steps, representing 44.44%.

Keyword: Increase, Efficiency, Cutting, PIPE, ECRS

1. Introduction

The expansion of industrial plants in Thailand has made construction service companies very important. The nature of the construction work is mainly to work on heights and underground floors with various depths. These works require the use of scaffolding in the construction to complete. Workers technicians, supervisors as well as engineers working in construction, they cannot avoid working at height without using scaffolding.

From the overall picture of the industry that has been expanding in the past motivate entrepreneurs More and more new entrants enter the industry. Makes competition more intense, reducing costs, reducing losses and wasting work is very important. Nowadays, Lean concepts are popular to apply in business operations (Kusuma Chaichot, 2016). Because the Lean concept is the organization of various activities that does not create added value, especially the waste that occurs in the production process helps to increase production opportunities, resulting in lower production costs (Thanit Prajakvinaibodee, 2018) and increase profits for good business results.

In this research, the researcher studied the cutting machine used in the process of cutting PIPE, which is a component in the scaffolding installation by applying Lean concepts to improve production process. Currently, the study found that there is a problem with how it works (Amphawan Noophrain, 2018) which in some stages of the work is complicated and in some stages takes too long to perform activities causing the work to delay the work. The researcher has considered the use of electric cutting machines instead of using a fiber cutter.



2. Research Objective

1. Study the waste occurring in the pipe cutting process.
2. Increase the efficiency of PIPE cutting.

3. Research Methodology

3.1 Educational process

1. Study the theory and related research.
2. Collect PIPE cut-off data.
3. Study the work process and observe current problem conditions.
4. Collect operational data for each step of the process.
5. Improve production process by using the ECRS principle to reduce wastage.
6. Summary of research results comparison of results between production methods that apply Lean concepts and current production systems.

3.2 Research tools

1. Flow process chart is a diagram of the steps in the overall process hierarchy in the organization. In this study, the researcher Process flow charts are used to study the PIPE cutting process by recording the steps of Detailed manufacturing processes in order from start to finish and collecting data.

2. Principles of ECRS is the principle used to improve the production process. This includes eliminate, combine, rearrange and simplify to reduce operational waste.

4. Research Results

Procedures for cutting pipes before improvement

Table 1

Flow process chart form shows the process of bringing PIPE into the factory.

Flow Process Chart				
CHART NO. SHEET NO.	SUMMARY			
ACTIVITY.	Activity	PRESENT	PROPOSE	SAVING
Bring the pipe into the factory truck	OPERATION ○	-		
	TRANSPORT →	2		
	DELAY □	-		
	INSEPTION □	-		
	STORAGE ▽	-		
	DISTRANCE (m.)	25		
	TIME (minute)	120		
DESCRIPTION	TIME (minute)	Distance	SYMBOL	Material Handling
1.Unload the pipe from the truck.	90	10	○ ● □ ▽	Froklift
2.Move the pipe to store on the patio	30	15	○ ● □ ▽	Froklift
SUM	120	25		

From the flow chart of the process of bringing PIPE into the factory. There were 2 activities in this step as follows: There were 2 movements, totaling a total distance of 25 meters of raw materials, using a total working process time of 120 minutes.



Table 2
Flow process chart form shows PIPE cutting process.

Flow Process Chart				
CHART NO. SHEET NO.	SUMMARY			
ACTIVITY.	Activity	PRESENT	PROPOSE	SAVING
PIPE cutting process	OPERATION ○	2		
	TRANSPORT ⇒	3		
	DELAY □	-		
	INSEPTION □	-		
	STORAGE ▽	-		
	DISTRANCE (m.)	155		
	TIME (minute)	81		
DESCRIPTION	TIME (minute)	Distance	SYMBOL	Material Handling
1. Take the pipe from the storage yard	3	150	○ ● □ ▽	Froklift
2. Bring the pipe wait to cut	2	2	○ ● □ ▽	Froklift
3. Place the pipe on the cutting machine	1	1	○ ● □ ▽	Person
4. Cut pipe to size	60	-	● ⇒ □ ▽	
5. Sort pipes by size	15	2	● ⇒ □ ▽	Person
SUM	81	155		

From the flow chart of the PIPE cutting process, the activities were found. In this process, there are 5 activities as follows: There are 2 operations, 3 movements, totaling a total distance of 155 meters of raw materials, using a total working process time of 81 minutes.

Table 3
Flow process chart form shows the grinding process.

Flow Process Chart				
CHART NO. SHEET NO.	SUMMARY			
ACTIVITY.	Activity	PRESENT	PROPOSE	SAVING
Grinding process	OPERATION ○	2		
	TRANSPORT ⇒	2		
	DELAY □			
	INSEPTION □			
	STORAGE ▽			
	DISTRANCE (m.)	235		
	TIME (minute)	51		
DESCRIPTION	TIME (minute)	Distance	SYMBOL	Material Handling
1. Take it to the pipe	4	230	○ ● □ ▽	Froklift
2. Pipe on the grinding machine	2	2	○ ● □ ▽	Froklift
3. Pipe grinding	30	1	● ⇒ □ ▽	-
4. Sort pipes by size	15	2	● ⇒ □ ▽	Person
SUM	52	235		



From the flow chart of the grinding process which found various activities There are 4 activities in this process as follows: 2 operations, 2 movements, a total distance of 235 meters of raw material movement, 51 minutes of working process time.

Table 4
Flow process chart form shows the process of spray painting and storage.

Flow Process Chart							
CHART NO. SHEET NO.	SUMMARY						
ACTIVITY. Painting and Storage	Activity	PRESENT	PROPOSE	SAVING			
	OPERATION ○	1					
	TRANSPORT ⇒	3					
	DELAY □	-					
	INSEPCION □	-					
	STORAGE ▽	1					
	DISTRANCE (m.)	47					
	TIME (minute)	67					
DESCRIPTION	TIME (minute)	Distance	SYMBOL			Material Handling	
			○	⇒	□		▽
1.Take the pipe to spray paint	2	20	○	●	□	▽	Froklift
2.Pipe next to the machine	2	2	○	●	□	▽	Froklift
3.Spray paint	60	-	●	⇒	□	▽	-
4.Take the pipe to store	2	25	○	●	□	▽	Froklift
5.Store	1	-	○	⇒	□	▽	Froklift
SUM	67	47					

Activities in this process, there are 5 activities as follows: 1 time of operation, 3 times of movement and 1 time of storage, totaling a total distance of 47 meters of raw material movement total 67 minutes.

Table 5
summarizes the time, distance and working steps of the PIPE cutting process before improvement.

Pipe Cutting Process	Distance (meters)	Time (minutes)	Workflow
1. Bring the pipe into the factory truck.	25	120	2
2. PIPE cutting process	155	81	5
3. Grinding process	235	51	4
4. Painting and Storage	47	67	5
Total	462	319	16



Steps in the cutting process after improvement

Table 6
Flow process chart form shows the process of bringing PIPE into the factory.

Flow Process Chart				
CHART NO. SHEET NO.	SUMMARY			
ACTIVITY.	Activity	PRESENT	PROPOSE	SAVING
Bring the pipe into the factory truck	OPERATION ○	-		
	TRANSPORT ⇒	2		
	DELAY □	-		
	INSEPCION □	-		
	STORAGE ▽	-		
	DISTRANCE (m.)	25		
	TIME (minute)	120		
DESCRIPTION	TIME (minute)	Distance	SYMBOL	Material Handling
1. Unload the pipe from the truck.	90	10	○ ● □ ▽	Froklift
2. Move the pipe to store on the patio	30	15	○ ● □ ▽	Froklift
SUM	120	25		

From the flow chart of the process of bringing PIPE into the factory. There were 1 activity in this step as follows: There were 2 movements, totaling a total distance of 25 meters of raw materials, using a total working process time of 120 minutes.

Table 7
Flow process chart form shows PIPE cutting process.

Flow Process Chart				
CHART NO. SHEET NO.	SUMMARY			
ACTIVITY.	Activity	PRESENT	PROPOSE	SAVING
PIPE cutting process	OPERATION ○	2		
	TRANSPORT ⇒	3		
	DELAY □	-		
	INSEPCION □	-		
	STORAGE ▽	-		
	DISTRANCE (m.)	63		
	TIME (minute)	63		
DESCRIPTION	TIME (minute)	Distance	SYMBOL	Material Handling
1. Take the pipe from the storage yard	2	60	○ ● □ ▽	Froklift
2. Place the pipe on the cutting machine	1	1	○ ● □ ▽	Person
3. Cut pipe to size	45	-	● ⇒ □ ▽	-
4. Sort pipes by size	15	2	● ⇒ □ ▽	Person
SUM	63	63		



From the flow chart of the PIPE cutting process, the activities were found. In this process, there are 4 activities as follows: 2 operations, 2 movements, a total distance of 63 meters of raw material movement, 63 minutes of working process time.

Table 8
Flow process chart form shows the grinding process.

Flow Process Chart					
CHART NO. SHEET NO.	SUMMARY				
ACTIVITY. Grinding process	Activity	PRESENT	PROPOSE	SAVING	
	OPERATION ○	-			
	TRANSPORT ⇒	-			
	DELAY □	-			
	INSEPTION □	-			
	STORAGE ▽	-			
	DISTRANCE (m.)	-			
TIME (minute)	-				
DESCRIPTION	TIME (minute)	Distance	SYMBOL		Material Handling
			○ ⇒ □ ▽		
SUM	-	-			

Improve the process in the grinding process. The researcher has improved the working method by adoption of Lean concepts by applying the ECRS principle, elimination (E) is the reduction of the grinding process. Combination (C) is the switch to a more efficient electric cutting machine. By cutting, it is possible to reduce the grinding step, and the simplification (S) is that the electric cutter cuts the pipe smoothly without grinding, which can reduce the time by 51 minutes/time (Suranit Samart, 2016).

Table 9
Flow process chart form shows the process of spray painting and storage.

Flow Process Chart					
CHART NO. SHEET NO.	SUMMARY				
ACTIVITY. Painting and Storage	Activity	PRESENT	PROPOSE	SAVING	
	OPERATION ○	1			
	TRANSPORT ⇒	-			
	DELAY □	1			
	INSEPTION □	-			
	STORAGE ▽	1			
	DISTRANCE (m.)	25			
TIME (minute)	63				
DESCRIPTION	TIME (minute)	Distance	SYMBOL		Material Handling
			○ ⇒ □ ▽		
1. Spray paint	60	-			-
2. Take the pipe to store	2	25			Froklift
3. Store	1	-			Froklift
SUM	63	25			



Improve the process in the painting and storage process. The researcher has improved working methods by adopting Lean concepts by applying the ECRS principle to elimination (E) is the reduction of pipe placement steps, combination (C) and simplification (S) are the staff paints the paint in the cut off area. The time can be reduced by 4 minutes/time (Suporn Daosuk, 2015).

Table 10

summarizes the time, distance and working steps of the PIPE cutting process improvement.

Pipe Cutting Process	Distance (meters)	Time (minutes)	Workflow
1. Bring the pipe into the factory truck.	25	120	2
2. PIPE cutting process	63	63	4
3. Grinding process	0	0	0
4. Painting and Storage	25	63	3
Total	113	246	9

5. Discussion

1) In the process of bringing PIPE to the factory, there is no processing program at this step.

2) Method for improving the process in the PIPE cutting process. The researcher has improved the working method by adopting Lean concepts. The researcher has reduced the waste of moving by rearranging the production layout organized according to the process (Process layout or Functional or Job-shop) is the arrangement of machines (Pattaranit Boonwang, 2013). Process tools in order to achieve smooth operation which the researcher has moved the cutting machine to a closer point. This cutter is more efficient in cutting, and make use of the ECRS principle. Elimination (E) is to reduce the work process in the part of bringing the pipe to the side of the cutting machine to wait for the cutting machine to be set up. When transporting PIPE from storage yards, it was found that there were more employees used to transport PIPE than necessary. Therefore, some employees were moved to set up the cutting machine at the same time in order to reduce wastage between waiting and moving without Required. Combination (C) is the combination of cutting and grinding steps. Rearrangement (R) is the rearrangement of the PIPE cutting area and the Easy (S) is the new cutter with more cutting efficiency. The time can be reduced by 18 minutes/session.

3) Grinding process by applying the ECRS principle, elimination (E) is the reduction of the grinding process. Combination (C) is the switch to a more efficient electric cutting machine. By cutting, it is possible to reduce the grinding step, and the simplification (S) is that the electric cutter cuts the pipe smoothly without grinding, which can reduce the time by 51 minutes/time.



4) by applying the ECRS principle to elimination (E) is the reduction of pipe placement steps, combination (C) and simplification (S) are the staff paints the paint in the cut off area. The time can be reduced by 4 minutes/time.

6. Conclusion

The results showed that after making improvements to the PIPE cutting process, it can reduce time, steps, and distances that cause waste as follows:

1) In the process of bringing PIPE to the factory, there is no processing program at this step.

2) The PIPE cutting process takes time to be reduced from 81 minutes to 63 minutes, which reduces the total time by 18 minutes, or 22.22%. Able to reduce the working process from the original 5 working steps. Reduce down to 4 steps, can reduce 1 step, 20%, and can reduce the distance used, reduced from 155 meters to 63 meters, which is a total distance reduction of 92 meters, equivalent to 59.35%.

3) Grinding process, the time spent was reduced from 51 minutes to 0 minutes, which reduced the total time to 51 minutes, representing 100%. The work process can be reduced from the original 4 steps to 0 steps. Can be reduced by 4 steps, representing 100%, and can reduce the distance used, reduced from 235 meters to 0 meters, resulting in a total distance reduction of 235 meters, representing 100%.

4) Paint spraying and storage process. The time spent was reduced from 67 minutes to 63 minutes, which reduced the total time by 4 minutes or 5.97% and was able to reduce the working process from the original 5 working steps down to 3 steps. Reduced by 2 steps, equivalent to 40%, and can reduce the distance used, reduced from 47 meters to 25 meters, which is a total distance reduction of 22 meters, equivalent to 46.81%.

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Feasibility Study of Investment in Rice Seed Dryers to Efficiency Enhancement of Commercial Rice Seed Production by the Community Rice Center: A case study

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Abstract

This research aims to study the feasibility of investing in rice seed dryers for the efficiency enhancement of commercial rice seed production. Data were collected through interview forms with community rice center members by analyzing the feasibility of marketing, management, technical, and financial aspects. Focus group discussion with the executive committee managing a community rice center and an in-depth interview with the president of the community rice center. The results of the study found that Ban Thung Ruang Thong Community Rice Center, Khao Khiris Sub-district, Pran Kratai District, Kamphaeng Phet Province is featured in the quality and quantity of rice seeds and has a rice seed planting area of approximately 3,132 rai. About 2,504 tons of rice varieties per production season management. It was found that the community rice center was managed according to the POSDCoRB theory in all 7 dimensions. The management level of the community rice center was at a very good level. In terms of technical aspects, it was found that this Rice Center was located near the community and was a community rice center that used agricultural machinery and agricultural technology in rice seed production. Financial analysis from the estimation of investment and income found that the average annual income was 5,891,760 baht. This project of investing in rice seed dryers for the enhancement of commercial rice seed production requires an average annual investment per year of 4,881,475 baht, with a net present value (NPV) of 4,651,153 baht, a rate of return on cost (BCR) of 1.11 and an internal rate of return (IRR) 30%. Therefore, it was concluded that it is possible to invest in rice seed dryers to increase the efficiency of commercial rice seed production at the Ban Thung Ruang Thong Community Rice Center.

Keywords: Feasibility study of investment, rice seed dryers, community rice center



1. Introduction

Rice seed dryers are a crucial technology that is required today to reduce rice seed moisture, save time, maintain rice seed quality for an extended storage period, and minimize rice seed loss during moisture reduction. This technology can be used by farmers as a tool to help farmer groups extend the production of commercial rice from production to processing, including the creation of a network through the use of rice seed dryers to dehumidify rice seeds at the community level for groups of nearby farmers to use the service together. It creates direct and indirect economic and social benefits for the area, which is in line with the Thai government's policy to develop the country according to the "Thailand 4.0" guideline, which is a policy to support the use of technology in agricultural activities, especially developing farmer groups to help increase production efficiency and increase returns for agricultural groups for maximum benefit (Laohavanit, 2018), including a pilot project based on the BCG economic model to bring knowledge to develop a holistic economy in three dimensions (biological economy, circular economy, and green economy) by maximizing benefit and cost-effectiveness in resource utilization (National Village and Urban Community Fund Office, 2022).

The community rice center is considered a group of farmers who play a significant role in driving technology and serving as a center for the transfer of technology in developing rice seed production and farmers' livelihoods. Additionally, the community rice center serves another vital purpose. Creating quality rice seeds to ensure that the farmers in the community have sufficient quantities of high-quality rice seeds that meet the standards of "Good Agricultural Practice Seed: GAP Seed" (Rice Department, 2021) for planting rice in the next round to meet their needs; in addition, neighboring communities can assist in resolving Thailand's critical seed shortage. Because rice seed is the main factor that will affect the amount of rice produced by farmers, which also affects farmer household income, the Ministry of Agriculture and Cooperatives has prioritized the development of community rice centers and increasing the quality of rice seeds that can help domestic rice cultivation get better yields with support from the Rice Department. There is support for the borrowing of agricultural tools such as rice seed cleaning machines. Rice seed dryers, etc. (Ministry of Agriculture and Cooperatives, 2019).

Currently, there are 2,387 community rice centers in Thailand (year 2020), but only 1.10% of all rice centers received support for the rice seed dryers from the Rice Department (Rice Department, 2021), and most of them still lack important equipment and are in need of rice seed dryers for dehumidifying rice seeds and a drying area for use in reducing the moisture content of paddy seeds and enhancing the efficiency of rice seeds in order to sell them on the market and obtain standard and quality rice seeds. The community rice center faces various problems related to the production of rice seeds, as follows: 1) The problem of insufficient drying area 2) Inclement weather 3) Members of the community rice center are approaching old age; the average age is more than 50 years, prompting the community rice center to seek out a machine to reduce labor and save time.



Ban Thung Ruang Thong Community Rice Center has a solution to the problem by selling paddy, which is the first rice seed, to the mill immediately. As a result, produce is sold at a price below what farmers should receive, and farmers cannot set their own prices (Muean-In, Interview, 2022), where the Department of Agricultural Extension has a project to upgrade large plots with modern farmers and connect markets, and the Rice Department has a large plot agricultural extension system project. Activity to enhance the rice seed production capacity of community rice centers with support for rice seed dryers. Due to the promotion of community rice centers, it is not possible to install rice seed dryers in every center in the country. Therefore, the Department of Agricultural Extension and the Department of Rice must evaluate the community rice center's potential in various fields, such as its capacity for management. Since rice seed dryers are expensive, it is essential to increase investment awareness and maximize returns. Therefore, this study aims to study the feasibility of investing in rice seed dryers to increase the efficiency of commercial rice seed production at community rice centers, to conduct an investment feasibility analysis for information to help plan and decide for community rice centers in the country whether this project should be invested in or not, and as information to request funding for rice seed dryers for community rice centers in the next order for the production of commercially integrated rice seeds.

2. Research Objectives

2.1 Survey the market environment marketing, management, technical, and financial information of investment in setting up a rice seed dryer in Ban Thung Ruang Thong Community Rice Center, Kamphaeng Phet Province.

2.2 Analyze the financial feasibility aspects of investing in rice seed dryers in Ban Thung Ruang Thong Community Rice Center, Kamphaeng Phet Province.

3. Research Methodology

This research was conducted as part of a dissertation titled "Management Strategies for Efficiency Enhancement of Commercial Rice Seed Production by the Community Rice Center, Kamphaeng Phet Province," and the study area, Ban Thung Ruang Thong Community Rice Center, was picked up as a case study on the Feasibility Study of Investment in Rice Seed Dryers to Efficiency Enhancement of Commercial Rice Seed Production by the Community Rice Center.

3.1 Population and Sample

The population used in this study was 84 people from Ban Thung Ruang Thong Community Rice Center, Khao Khiris Sub-district, Phran Kratai District, Kamphaeng Phet Province.

The sample group consisted of 38 members of the Ban Thung Ruang Thong Community Rice Center, as determined by the dissertation's sample group calculation.

3.2 Data Collection

1) Primary data were collected through in-depth interviews with the president of the community rice center, a sub-group meeting with the executive committee of the community rice center, and a sample group of members of the Ban Thung Ruang Thong Community Rice Center.



2) Secondary data collected from documents, books, and research related to the theory of internal and external environment analysis of community rice centers, the management theory of the organization, and policies on community rice centers on the websites of various related agencies, such as the Department of Rice, the Department of Agricultural Extension, etc.

3.3 Research Tools

This study was divided into two types: 1) qualitative research tools and 2) quantitative research tools as follows:

1) Qualitative research tools consist of:

1.1) In-depth Interview with the President of the Community Rice Center for technical and financial analysis

1.2) Focus group meetings with the management committee of the community rice center and members of the community rice center to analyze the center's internal and external situation (SWOT analysis) for marketing analysis.

2) The Quantitative research tool was an interview form for interviewing the opinions of the members of the community rice center on the management of the community rice center. Under the theoretical framework, "POSDCoRB" consists of Planning, Organizing, Staffing, Directing, Coordinating, Reporting, and Budgeting by dividing opinion levels according to the 5-level Likert scale as follows:

5 Points: Strongly agree (the management of community rice center is excellent)

4 Points: Agree (the management of community rice center is good)

3 Points: Neither agree nor disagree (the management of community rice center is fair)

2 Points: Disagree (the management of community rice center need to be improved)

1 Point: Strongly disagree (the management of community rice center urgently needs to be improved)

3.4 Data Analysis

Analyze feasibility of the project in four aspects, including market feasibility, management feasibility, technical feasibility, and financial feasibility. Conduct a focus group meeting with the community rice center management committee to analyze the internal and external environment (SWOT) and management analysis, technical and financial analysis. Details are as follows:

1. Market feasibility: Analyze to ability of the community rice center into manage marketing aspect to find its competitive advantage. By the researcher looks at the community rice center's strengths, weaknesses, opportunities, and problems to figure out if it can sell rice.

2. Management feasibility: The researcher analysis the management level of Ban Thung Ruang Thong Community Rice Center by conducting an interview form for members' opinions on community rice center management based on POSDCoRB theory. The criterion for analyzing the level of community rice center members' opinions towards community rice center management is divided into 5 levels. The interpretation of the scores will be based on the following criteria:



The average score of 1.00–1.80 indicates that the community rice center's management level urgently needs to be improved.

The average score of 1.81–2.60 indicates the level of community rice center management needs to be improved.

The average score of 2.61–3.40 indicates the management level of the community rice center is fair.

The average score of 3.41–4.20 indicates the management level of the community rice center is good.

The average score of 4.21–5.00, indicates the management level of the community rice center is excellent.

3. Technical feasibility: The researcher looks at where services and facilities are located at the community rice center.

4. Financial feasibility: By projecting income and investment and analyzing net present value (NPV), benefit-to-cost ratio (BCR), and internal rate of return (IRR).

4.1) The net present value (NPV) analysis is the difference between the sum of the present value of the returns received and the sum of the present value of the costs paid in each year of the project.

$$NPV = \sum_{t=0}^n \frac{B_t - C_t}{(1 + r)^t}$$

The decision criterion is $NPV > 0$, indicating that the investment project is feasible.

4.2) The benefit-cost ratio (BCR) is the ratio between the sum of the present value of the returns received and the sum of the present value of all costs paid for the project.

$$BCR = \frac{\sum_{t=0}^n \frac{B_t}{(1 + r)^t}}{\sum_{t=0}^n \frac{C_t}{(1 + r)^t}}$$

The decision criterion is $BCR > 1$, indicating that the investment project is feasible.

4.3) The internal rate of return (IRR) is the rate of return that makes the present value of the return equal to the present value of the project's cost or the rate of return that makes the net present value equal to zero.

$$\sum_{t=0}^n \frac{B_t - C_t}{(1 + r)^t} = 0$$



The decision criterion is if the IRR value > the rate of return on investment, showing that the investment project is feasible for investment because it is considered to have a higher return than the opportunity cost of the capital.

Where:

Bt = the value of the gain in year t

Ct = investment value and additional expenses in year t

r = interest rate

t = project year, i.e., years 0, 1, 2, 3, ..., n

n = project age

Predicting investments and income,

1. The cost analysis of the rice seed dryer consists of two types of costs, fixed costs and variable costs

1.1 Fixed costs are as follows:

- 1) Rice Seed Dryers.
- 2) Rice Seed Drying Plant.
- 3) Depreciation of rice seed dryers and rice seed drying plants for 10 years.
- 4) The opportunity cost of investing in rice seed dryers and rice seed drying plants Interest rate MRR: 6.50%.

1.2 Variable costs are as follows:

- 1) The cost of buying paddy from members is 8,500 baht per ton, with moisture at 22%.
- 2) Maintenance costs are 5% of the value of rice seed dryers and rice seed drying plants.
- 3) Fuel costs, equivalent to 441.6 baht per ton of rice seed.
- 4) The cost of labor for managing and during drying to reduce the humidity of rice seed is 350 baht per 1 ton of rice seed.
- 5) Electricity cost: 50 baht per ton of rice seed.
- 6) Labor cost: 350 baht per day, per person.
- 7) The cost of sacks and equipment is 5 baht per sack.

2. Analysis of income from selling rice seeds after using rice seed dryers, assuming that the amount of paddy after moisture reduction is 80% of the total weight of paddy and that rice sacks are sold for 420 baht per 25 kilograms, for a total of 14,028 sacks.

4. Research Results

1. Results of the market feasibility study.

The Ban Thung Ruang Thong Community Rice Center was registered in 2008 as a group of farmers who produce rice seeds for the Kamphaeng Phet Rice Seed Center. Most of the rice seeds produced are commercial rice seeds and rice varieties produced are RD 29, RD 41, RD 79, etc. There are approximately 3,132 rai of rice seed planting areas, producing 2,504 tons of rice seeds per season, or approximately 1,628 tons of seeds that members will bring to sell to the Kamphaeng Phet Rice Seed Center, which has the largest rice seed production area



in Kamphaeng Phet Province, for expansion and further distribution, and approximately 876 tons of good quality paddy that Ban Thung Ruang Thong Community Rice Center must manage on its own after selling it to mills in the network that have contracted for approximately 50% of the quantity of good quality paddy.

The study of the internal environment revealed that the Ban Thung Ruang Thong Community Rice Center has strengths in the quality and quantity of rice seeds and can produce approximately 1,628 tons of rice seeds per production season, according to GAP Seed standards, the community rice center is close to the community and is accessible, and the members of the community rice center are united and form a strong group. The weakness is the insufficient funds for purchasing rice seeds from members, and the operating model is not yet decentralized thoroughly. The opportunities are the Department of Rice, the Department of Agricultural Extension, and the Department of Land Development always support farmers, and the community rice center has a network of rice mills to sell the seeds of its members, including the distribution channels for rice seeds can be added online.

The Threat is that the weather is gradually fluctuating, making it difficult to control external factors in the production of rice seeds in the rice fields, such as pests and diseases, including the problem of production costs.

2. Results of the management feasibility study.

The researcher applied POSCoRB organizational management theory to understand the management and operation of Ban Thung Ruang Thong Community Rice Center.

Observed that:

1) Planning: The Community Rice Center has set clear goals, objectives, and rules for the group. This includes marketing planning to find ways to get paddy to members, but the financial side is not very strong because of COVID-19, which stopped paddy trading.

2) Organizing: The community rice center has clearly defined the roles and responsibilities of each position and is aware of the members' efforts to control the standard of rice seeding, starting with the management of the rice fields, such as inspecting the off-type plants, etc., as well as post-harvest care, but the rice center does not have activities to motivate or encourage members. This may have a long-term impact on the lack of people to manage the community rice center in the future.

3) Staffing: According to the records of the community rice center, the management service committee has been chosen, and the board of directors has the knowledge and skills to solve problems and do its job well enough to reach the goals.

4) Directing: The chairman of the community rice center has a leadership position and manages the community rice center with a focus on the people's benefit.

5) Coordinating: The Community Rice Center has established a network with the mill, which is a buyer of rice seeds from the group members, who have specified varieties and purchase quotas.



6) Reporting: The Community Rice Center has recorded the agenda and kept it in a book.

7) Budgeting: The community rice center still faces liquidity problems in managing the working capital of the center and funds for purchasing products from members, but in the overall picture of the management of the Ban Thung Ruang Thong community rice center, the level of management of the center is very good.

Table 1

The level of opinion held by members of community rice centers regarding the management.

Items	Mean (\bar{x})	S.D.	Interpretation
1. Planning	4.26	0.29	The management level of the community rice center is excellent.
2. Organizing	4.24	0.28	The management level of the community rice center is excellent.
3. Staff	4.40	0.30	The management level of the community rice center is excellent.
4. Directing	4.32	0.29	The management level of the community rice center is excellent.
5. Coordinating	4.23	0.28	The management level of the community rice center is excellent.
6. Reporting	4.06	0.27	The management level of the community rice center is good.
7. Budgeting	4.01	0.27	The management level of the community rice center is good.
Total	4.22	0.28	The management level of the community rice center is excellent.

3. Results of the technical feasibility study: The area for installing the rice seed dryer at the headman's office is Village No. 14, Khao Khiris Sub-district, Phran Kratai District, Kamphaeng Phet Province, and is home to a group of farmers who produce good seed varieties. In 2017, Ban Thung Ruang Thong Community Rice Center received a rice seed sorting machine supported by the Provincial Agriculture Office. In addition to the rice seed sorting machine, the Ban Thung Ruang Thong Community Rice Center also has other rice seed production equipment, including combine harvesters, drones, rice transplanters, etc.

4. Results of the financial feasibility study: From the forecast of income and investment, the estimated average annual income was found to be 5,891,760 baht. This project uses an annual investment of 4,881,475 baht. (table 2) and has a net present value (NPV) of 4,651,153 baht, a rate of return on cost (BCR) of 1.11 means if that the community rice center set up a rice seed dryer will have income more than cost, and an internal rate of return (IRR) of 30% means that investment



in a rice seed dryer yields a rate of return equal 30 %. (table 3). Therefore, it is a feasible to invest in rice seed dryers.

Table 2
Total investment and total annual profit (10 years of service)

Item	Baht
Fixed cost	
Cost of a rice seed dryer and other equipment	1,750,000
Depreciation of the rice seed dryer	157,500
Opportunity cost of the rice seed dryer	123,988
Building	1,400,000
Building depreciation	126,000
Opportunity costs of the building	99,190
Variable cost	
Cost of buying seeds	3,726,400
Fuel cost	193,597
Electricity bill	21,920
Fees for workers who handle rice seeds during the drying process	153,440
Cost of sacks and equipment	70,140
Labor costs	51,800
Maintenance fee	157,500
Average annual investment	4,881,475
Average annual income	5,891,760

Table 3
Financial feasibility of rice seed dryers at Ban Thung Ruang Thong Community Rice Center

Discount rate	NPV (Baht)	BCR	IRR
6.50%	4,651,153	1.11	30 %

5. Discussions

From the market feasibility analysis, it was revealed that the Community Rice Center was supported by relevant agencies such as the Rice Department, the Department of Agricultural Extension, and the Department of Land Development. The community rice center has built a network with the mill to bring members' rice seeds to sell, and the distribution channels for rice seeds can be added online. Consistent with Darwis, et al., (2021) findings, the development of marketing networks and government relations represents an opportunity for farmers to expand their rice seed businesses. Similar to Harry et al., (2021), discovered that the Ministry of Agriculture and Cooperatives in Thailand provides rice farmer groups with various supports. For instance, enhancing the organization's potential and promoting the use of agricultural technology among farmers. However, rice



farmers still have to deal with changing weather, which makes it hard to manage and expensive to grow rice.

In terms of management, it was discovered that the level of management, according to the POSDCoRB theory, is excellent in all 7 dimensions of the community rice center. Consistent with the findings of Chongesiroj & Bunchapatanasakda. (2019). It was determined that the level of opinions regarding professional group management (POSDCoRB) was excellent, with excellent levels for Staffing, Reporting, Directing, Planning, and Organizing, and a good level for Coordinating.

In terms of technical, The Community Rice Center is supported by relevant agencies such as the Rice Department, the Department of Agricultural Extension. Especially in the field of various agricultural equipment, such as harvesters, drones, etc., which is consistent with Chantararat et al. (2019) who found that most farmers know drones and they are interested and confidence in the capabilities of drones.

In terms of finances, income and investments have been estimated, and the average annual income has been determined to be 5,891,760 baht. This project uses an average investment per year of 4,881,475 baht with a net present value (NPV) of 4,651,153 baht. The cost of return (BCR) is 1.11, and the internal rate of return (IRR) is equal to 30 percent. Therefore, the project has investment potential. According to Isawilanont (2000) study on the impact assessment of the rice seed dryer development project, it revealed that the project will generate a net return on investment of 1,322.41 million baht with a cost return of 343 % and an internal rate of return (IRR) of 237.9 and Swastika (2012) studied The Financial Feasibility of Rice Dryers: A Case Study in Subang District, West Java. It was revealed that rice seed dryers using the sun-dried area had an IRR of 44.44%, using gas fuel had an IRR of 233.47%, and using rice husk fuel had an IRR of 260.49%. This demonstrates that, of the three types of rice seed dryers tested, the one that uses rice husk fuel is the most profitable, probable, and likely to be promoted to farmer associations, rice traders.

6. Conclusion

From a feasibility study of investing in a rice seed dryer to increase the efficiency of commercial rice seed production at Ban Thung Ruang Thong Community Rice Center, Khao Khiris Sub-district, Pran Kratai District. Kamphaeng Phet Province, both in terms of marketing and technical management, and financially, found that the community rice center has marketing advantages and a network with mills. Overall, the management level of the community rice center was at a very good level and has technology production, machine, and equipment that supports commercial rice seed production. as well as if Community Rice Center set up a rice seed dryer can be an income of 4,651,153 baht and, a rate of return on cost (BCR) of 1.11 which showed that income more than cost and an internal rate of return (IRR) of 30%. Therefore, it was feasible to invest in a rice seed dryer.

7. Recommendation



1. There should be support for the management of the community rice center to be able to use the rice seed dryer to more effectively reduce rice moisture.
2. The community rice center management committee should increase management operations in terms of data reporting and budget management (Reporting and Budgeting) according to the POSDCoRB theory, found that there still the management level of community rice center management is good.
3. The government should promote the budget for rice seed dryers or drying terraces for community rice centers so that community rice centers can produce commercial rice seeds. It should also choose good community rice centers to run community rice centers that need rice seed dryers to make commercial rice seed production more efficient.

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Efficiency Measurement Factors of Carbon Footprint in Warehouse Activities

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Abstract

Climate change and ecosystem degradation caused by the trend of world's carbon footprint increasing. The logistics aspect is considered to be an important part of carbon footprint emission both directly and indirectly. Thailand needs careful and comprehensive strategic planning in various areas as a framework to drive the country's development towards stability, prosperity, and sustainability as part of solving global warming problems by finding innovation in logistics management especially in the warehouse where there is no research that focuses on studying the carbon footprint of warehouse activities by qualitative research. This article aims to study the efficiency measurement factors of carbon footprint in warehouse activities. The implementation steps of this research consisted of 1) literature review 2) creating in-depth interview 3) in-depth interviews with relevant persons, and 4) analyzing and synthesizing study results. The research results found that the carbon footprint efficiency measurement factors in warehouse activities was divided into 2 parts: 1. Activities within the warehouse, consisting of 15 activities; product control, purchasing, ordering, receiving, counting, distribution, bringing goods to store, storage, product level maintenance, product selection, inspection, packaging and marking, consolidation, transportation and administrative work. 2. The related part to the warehouse consists of 6 parts: area, water, electricity, equipment, vehicles, and people. In measuring the efficiency of carbon footprint emissions in warehouse activities, it is necessary to classify measurements into 3 types: direct carbon footprint calculation, calculation of indirect carbon footprint from energy use, and calculate other indirect carbon footprints to know the source of occurrence and the correct amount of discharge to be able to properly plan for managing the carbon footprint of warehouse activities efficiently.

Keywords: Efficiency measurement, carbon footprint, warehousing activities

1. Introduction

Climate change and ecosystem degradation situation will pose challenges to national development in terms of security, economy, society, environment, and competitiveness. Thailand needs careful and comprehensive strategic planning in various areas as a framework to drive national development towards stability, prosperity, and sustainability (Office of the National Economic and Social Development Council, 2022). For example, applying technology and innovation in logistics management and utilizing infrastructure in various areas to continuously carry out activities in all sectors for more efficient management. Energy



conservation in line with economic, social and environmental contexts by utilizing and creating growth based on natural resources and the environment provides a balance in the capacity of ecosystems to improve energy efficiency in logistics systems that are environmentally friendly. It is an important supporting factor for building competitiveness increase the potential for economic expansion and prepare for economic and social strength conducive to the achievement of development objectives in all areas of the country with a focus on expanding capabilities, improve the quality and efficiency of energy logistics infrastructure to enhance the productivity of the manufacturing and service sectors, reduce production costs and internationally competitive services, systematically promote linkages with sub-regions and regions. Including developing management systems and adapting to keep up with the trends of technological changes in the future including forms of capital and labor movements, trade, as well as new trade barriers in line with international standards to elevate Thailand into a competitive high-income country (Office of the National Economic and Social Development Council, 2022). The conditions of trade and investment according to new world standards likely that country, especially western countries. It may serve as a condition for establishing a framework for international cooperation in trade and investment, or to give greater importance to the establishment of social standards and environment. That focuses on reducing greenhouse gas emissions and creating a low-carbon society (Office of the National Economic and Social Development Council, 2022). Improve the efficiency of Thailand's international logistics to reduce barriers international trade from the implementation of international cooperation agreements (Office of the National Economic and Social Development Council, 2022), by raising the standards of environmentally friendly logistics services according to international standards in the competitiveness of the manufacturing sector and existing services to be able to grow continuously by bringing knowledge, technology and innovation to improve production efficiency, reduce waste in the production process to zero. Recycle of resources or to create added value according to the principles of the circular economy. Raising standards to be a source of production and service with quality and safety have good hygiene; give importance to environmentally friendly production systems. Sustainable production measures equivalent to international standards including upgrading products or services through the use of innovation. The goal is to be a leader in production and service both nationally and globally (Office of the National Economic and Social Development Council, 2022). Carbon Footprint is the continuous emission of greenhouse gases from various human activities, whether from energy use, agriculture, development and expansion of the industry, transportation, and deforestation. And other forms of environmental destruction are the major causes of global warming, which has affected to the livelihood of human beings, creatures and the environment. That is increasing day by day, so reducing greenhouse gas emissions to reduce global warming, it is the duty of all involved parties both industrial and agricultural sectors as producers service sector as an activity driver, including the public sector as consumers (Thailand Greenhouse Gas Management Organization (Public Organization), 2022).

One of the major causes of global warming is the carbon footprint of the manufacturing sector, which around the world has tried to solve the problem by



promoting the display of carbon footprint information on products. Thailand has a tendency to increase carbon footprint emissions from national development activities from carbon footprint information. In 2011, the amount of carbon footprint emission was 305.52 million tons of carbon dioxide, and from the estimate of the amount of emissions is as high as 555 million tons of carbon dioxide equivalent in 2030. The economic sector with the highest proportion of carbon footprint emissions is the energy sector, followed by agriculture, industrial processes, and waste. In addition, the Germanwatch (a German non-governmental organization) ranking lists Thailand as one of the top 10 countries at high risk of long-term climate change and the Climate Center's climate change projections, the Meteorological Department concluded that in 2022 - 2035, Thailand has an increasing average temperature. Therefore, international measures aimed at sustainable economic, social and environmental growth must be implemented and integration with long-term national development guidelines. In addition, Thailand has demonstrated a Nationally Determined Contribution (NDC) in implementing the Paris Agreement on climate change by making proposals for the country's participation in reducing the carbon footprint Operations on climate change after 2020 that are consistent with the Sufficiency Economy Philosophy and Sustainable Development Continuing operations under the Nationally Appropriate Mitigation Actions (NAMA) framework and setting a goal to reduce carbon footprint in 2030 by setting a target to reduce carbon footprint at 20 - 25% (Office of Natural Resources and Environmental Policy and Planning, 2022).

In recent years, there has been a steady increase in global carbon footprint emissions, which is a key contributor to the greenhouse effect and is associated with significant damage to the environment. Logistics activities in global supply chains have become a major cause of industrial emissions and growing environmental pollution. Although many of the logistics-related carbon footprints are generated by the storage and handling processes of materials in warehouses, there is a significant impact on logistics. By calculating the carbon footprint of global logistics networks, the four main sources of emissions are as follows (Thailand Greenhouse Gas Management Organization (Public Organization), 2022).

1. Domestic transport: Emissions from road transport e.g., fuel associated with the movement of goods in the country of origin/destination between the factory and the port of origin/destination.
2. International Shipping: Emissions from Ocean Vessels such as fuel between the ports of origin and destination.
3. Warehouse Operations: Emissions from electricity consumption in warehouse maintenance as well as refrigeration equipment and other supporting activities.
4. Port Operations: Greenhouse Gas (GHG) emissions of all port activities, including electricity and fuel consumption by operator-controlled facilities and equipment.

Most of the past research has focused on the environmental impact of transportation. Few studies have looked at the environmental impact of warehousing activities (Ries, J. M., Grosse, E. H. & Fichtinger, J., 2016). Reducing the carbon footprint caused by warehouse activities in Thailand is very important,



because it is one of the most obvious indicators of warehouse energy use. It emits both direct and indirect carbon footprints. The carbon footprint of a warehouse depends on many factors such as distance, area, documents used in work, and the type of equipment used in the warehouse including the various logistics activities that occur at present, the calculations for monitoring and reporting the results of carbon footprint emissions. Based on the analysis of carbon footprint emissions according to the European Standard CEN EN 16258 "Methodology for calculation and declaration of energy consumption and GHG emissions of transport services", when considering the entire warehouse supply chain. This includes storage, sorting and handling of goods as well. The carbon footprint analysis from warehouse activities has a carbon footprint calculation from the use of thermal energy fuels and refrigerants of all the individual activities that occur throughout the warehouse operations supply chain (Maimun, Sareephattananon, Rattanatai & Teekasap, 2017).

Studies on carbon footprint management in logistics activities have received increasing interest. Especially managing the carbon footprint in organizations or companies that provide logistics services, to categorize and manage carbon footprint reduction to make supply chain operations more efficient (Herold & Lee, 2017). It was found that most research focuses on measuring carbon footprint emissions on transportation activities. The problem of transport routing is a problem that is studied in the field of the carbon footprint of warehouses as a whole. This shows that there is no research that focuses on carbon footprint factors in warehouse activities. The researcher is interested in studying the efficiency measurement factors of carbon footprint in warehouse activities, which is the main goal of this research to know the carbon footprint factors in warehouse activities As well as to be a guideline for planning, managing, operating in warehouse activities that are friendly to the environment, including reducing the logistics cost and create competitive advantages in the future.

2. Research Objectives

Study the efficiency measurement factors of carbon footprint in warehouse activities.

3. Research Methodology

3.1 Samples

In this research, there are 3 groups of sample selection methods:

3.1.1 Determined according to the proposals of qualitative research scholars by using a case study design (Creswell, 2007).

3.1.2 Determine from past research that the problem and the research design was similar. By looking at the data saturation point in those studies and using it as a base for determining the sample size in the design and planning the research (B. Marshall et al., 2012; Onwuegbuzie & Leech, 2007).

3.1.3 Determine by internal reasoning using statistics showing the saturation point in the data by bringing information from qualitative research according to various strategies let's calculate the data saturation point using computational statistics (B. Marshall, Cardon, Poddar, & Fontenot, 2013).



This qualitative research requires experts with knowledge and experience to analyze, synthesize and certify data in order to confirm the accuracy, suitability and acceptance of this research. The criteria for key informants' selection were defined as follows (Moser & Korstjens, 2018; Suri, 2011).

- High-level executives in the warehouse service business for at least 5 years who have good knowledge and understanding of warehousing activities.

- Academics with knowledge and expertise in warehousing with experience teaching in universities or affiliated with a government agency for not less than 5 years.

- Carbon Footprint Measurement Expert Group, a registered organization from Thailand Greenhouse Gas Management Organization (Public Organization) not less than 5 years.

The key informants in the research consisted of 3 main groups of 17 persons according to the concept of Francis et al. (2010), classified as follows:

- The entrepreneurs in the warehouse service business size S 3 persons, M 3 persons, L 5 persons who are registered as juristic persons and are currently operating the business.

- Academic group who are experts in warehousing, such as academics or university professors, 3 persons.

- Carbon Footprint Measurement Expert Group that has been registered by the Greenhouse Gas Management Organization (Public Organization), 3 persons.

3.2 Research Instruments

3.2.1 This research used in-depth interviews to drill down to the activities within the warehouse and focus group in order to confirm the information obtained once again. The researcher has prepared open-ended questions using unstructured interviews. (Kerlinger & Lee, 2000, p. 693), in accordance with the objectives and covers the required information from the review of relevant literature to develop an interview structure for collecting data from a sample of warehouse operators in Thailand. The questionnaire in the interview will specify the sub-activities within the warehouse activities and conduct in-depth interviews contributor groups to add sub-activities and or modify the management order of warehouse activities to find the data saturation point.

3.2.2 The researcher developed an interview form used in this research to make the interview tool accurate accuracy and reliable. The researcher has carried out the inspection and quality testing of the tools used in the research as follows:

- Content validity testing to check the correctness of the question, text, content, language used to ensure that it is accurate and covers the research objectives. This will make the research tool or questionnaire reliable with precision analysis by conducting a validation check. The researcher brings the interview form to 5 experts who are experts in warehouse service business, research and statistics used in measurement. The experts will evaluate each question one by one and complete all questions. After that, the interview form that has already been assessed by the experts was used to determine the content



consistency index with the objectives of the research. Then consider the question and select only the question with the IOC value greater than 0.5 (Bollen, 1989).

- Reliability is a test that using this questionnaire multiple times will produce the same results and respondents. This confidence check will take the revised questionnaire, presentation of advisors considers completeness and used to experiment with a sample of 3 people from the group of informants. Then check the reliability of the instrument using the Cronbach's alpha coefficient formula (Cronbach, 1990). That must have a value of 0.8 or more before it will be used to collect the data (Wanichbuncha, 2010).

3.3 Analysis

From the synthesis of information obtained from the study of concepts, theories, academic papers, articles, journals, research reports related to warehousing activities and in-depth interviews with those involved in warehouse activities until being able to know the factors measuring the efficiency of carbon footprint emissions in warehouse activities.

4. Research Results

From study the efficiency measurement factors of carbon footprint in warehouse activities can create a model to measure the carbon footprint efficiency in warehouse activities of every warehouse as follows

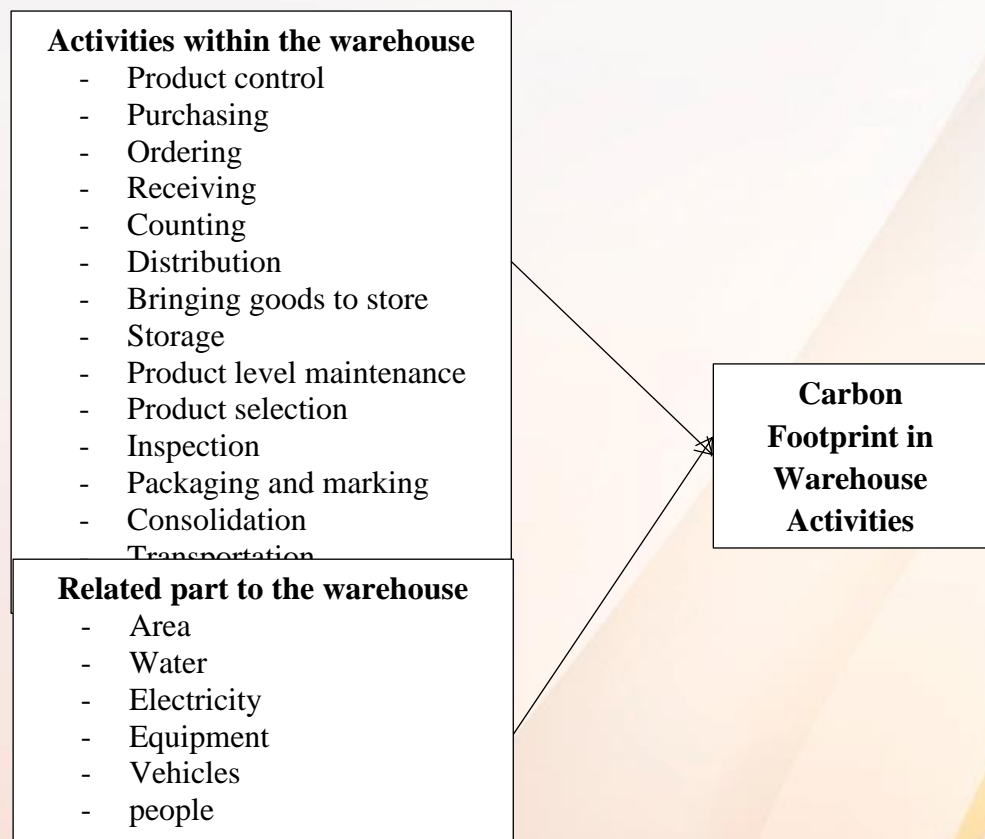


Figure 1



Carbon Footprint Efficiency Measurement Model for Warehouse Activities

5. Discussion

A carbon footprint efficiency measurement model for warehouse activities is a valuable tool that can help companies better understand and manage their environmental impact. Such a model can be used to identify areas where carbon emissions can be reduced and to track progress over time. One of the key benefits of such a model is that it allows companies to focus on the most impactful activities. For example, a warehouse may be responsible for a significant portion of a company's carbon emissions, but not all activities within the warehouse are equally impactful. By identifying the most carbon-intensive activities, the company can prioritize efforts to reduce emissions and achieve greater carbon efficiency. In addition to helping companies reduce their environmental impact, a carbon footprint efficiency measurement model can also be used to demonstrate a company's commitment to sustainability. This can be an important factor for customers, investors, and other stakeholders who are increasingly concerned about the environmental impact of the companies they work with.

6. Conclusion

In measuring the efficiency of carbon footprint emissions in warehouse activities, it is necessary to classify measurements into 3 types: direct carbon footprint calculation, calculation of indirect carbon footprint from energy use, calculate other indirect carbon footprints to know the source of occurrence, and the correct amount of discharge to be able to properly plan for managing the carbon footprint of warehouse activities efficiently.

However, implementing a carbon footprint efficiency measurement model can be challenging, particularly for smaller companies with limited resources. It may require significant investment in data collection and analysis, as well as changes to operational processes and procedures. Furthermore, it is important to recognize that a carbon footprint efficiency measurement model is just one tool in a broader sustainability toolkit. Companies should also consider other strategies, such as increasing the use of renewable energy, promoting sustainable transportation options, and reducing waste.

7. Recommendations

Some recommendations for a Carbon Footprint Efficiency Measurement Model for Warehouse Activities. Here are some suggestions:

1. Identify relevant greenhouse gas emissions: The first step in developing a carbon footprint efficiency measurement model is to identify the relevant greenhouse gas emissions associated with warehouse activities. This may include emissions from transportation of goods to and from the warehouse, energy consumption within the warehouse, and emissions from waste disposal.

2. Set a baseline: Once the relevant emissions have been identified, set a baseline for the current level of emissions. This can be used as a starting point for measuring progress towards improved efficiency.

3. Establish performance indicators: Develop key performance indicators (KPIs) to measure efficiency in each relevant emissions category. For example,



KPIs could include the amount of energy consumed per unit of goods stored or transported, or the amount of waste produced per unit of goods handled.

4. Collect data: Gather data on the relevant emissions and KPIs. This may involve installing sensors or meters to measure energy consumption or collecting data from transport providers or waste disposal companies.

5. Analyze and report: Use the collected data to analyze performance and report on progress towards improving efficiency. This could include regular reporting on KPIs and progress towards emissions reduction targets.

6. Implement improvements: Based on the analysis, identify areas for improvement and implement changes to reduce emissions and improve efficiency. This may involve investing in more energy-efficient equipment or processes or finding ways to reduce waste.

7. Monitor and adjust: Regularly monitor performance and adjust the carbon footprint efficiency measurement model as needed. This could include updating KPIs or changing data collection methods.

By following these steps, a comprehensive carbon footprint efficiency measurement model can be developed for warehouse activities, helping to reduce emissions and improve efficiency over time.

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A NOVEL DRUG CANDIDATE FROM PHOMOPSIS ARCHERI TO INHIBIT HIV-1 REVERSE TRANSCRIPTASE RNASE H ACTIVITY USING DATA MINING PROCESS

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Abstract

HIV-1 and its variants have caused dissemination accounted for an estimated 520,000 infected people during 2021 period in Thailand. HIV+ people require lifelong antiretroviral therapy and treatment, which may cause long-term side effects. Moreover, alternative drug candidates should be investigated to stimulate antiretroviral therapy and minimise the side effects. In this study, we have improved a process to identify the target HIV-1 protein and novel drug candidates. To determine the most coherent target from the HIV-1 genome database, 98 genome was selected according to MultiQC analysis for further data mining related to the viral replication and reverse transcriptase enzyme. The RNase H activity of the reverse transcriptase was selected as the potential target due to its low mutation rate and high conservative sequence determined using MAUVE analysis. In further analysis, a library of around 94.000 small inhibitor molecules was tested and potential hits were identified for the RNase domain of the reverse transcriptase by virtual screening methods.

Within compounds, four candidates; (a) 4-hydroxy-3-[5-[5-(2-hydroxyphenyl)-1H-pyrazol-4-yl]-4,5-dihydro-1H-pyrazol-3-yl]chromen-2-one (C₂₁H₁₆N₄O₄), (b). Artoindonesianin P (C₂₀H₁₆O₇), (c) 12a-Hydroxydolineone (C₁₉H₁₂O₇), (d) Phomoarcherin B (C₂₃H₂₈O₅) giving the best scores were considered and their interaction with target enzyme was analysed. ADMET assays performed on hit compounds showed drug candidates based on their physicochemical and pharmacological properties. Particularly, a natural compound, Phomoarcherin B, which is able to penetrate through the brain-blood barrier, produced by the fungus *Phomopsis archeri*, has shown the highest potential inhibitory effect on the HIV-1 reverse transcriptase RNase H activity depending on computational analysis.

Keywords: HIV-1, Reverse Transcriptase, Computational biology, Drug discovery.



Armature-coils heat cooling of railway traction motor by using the Low-speed rotating heat pipe.

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Abstract

This research is for the purpose of developing heat dissipation from the train traction motor shaft by using a low-speed rotating heat pipe instead of the original motor shaft and increased cooling efficiency at the traction motor shaft. The shaft used for the experiment is black steel SCH 40 pipe with an outer diameter of 4.2 cm and 60 cm length. There are two different cases in the study, first the hollow shaft filled with water 50% by volume and another one without filled water. It requires two heaters of 3,000W with electric input of 450W. The results of the experiment found that the hollow pipe filled with water has better cooling performance at 50% higher than the non-water filled one.

Keywords: Armature-coil, Train traction motor, Rotating heat pipe.

1. Introduction and Objective

Current electric train uses different types of electric motors in order to drive wheel traction machines. The electric motor is responsible for converting electrical energy into mechanical energy to traction the wheels of the locomotive, which is called "Traction Motor" the motor can be either a DC (Direct current motor) or AC (Alternating current motor) depending on designer's decision. While the motor is running The Armature coil and stator coil must be subjected to the torque generated by the magnetic field at all times. The working time of the motor affect the heat level of its motor. Therefore, cooling problem is one of the vital aspects when it comes to motor design. It is generally defined as the standard for the thickness of the insulating layer covering the copper coil. But if the heat exceeds the specified limit the insulating ability will also deteriorate. It is the main cause of motor burns. In addition, higher temperatures cause the grease in the bearing to melt. This causes the bearing to be damaged immediately. Moreover, the problem of heat generation also results in reduced motor efficiency. The issue of heat dissipation from the armature coil and stator coil that is wound to the shaft core is the main problem in the armature coil and armature coil being over heat. Therefore, heat-controlled temperature can protect and prevent equipment from damage. It can also avoid of overheat problem.

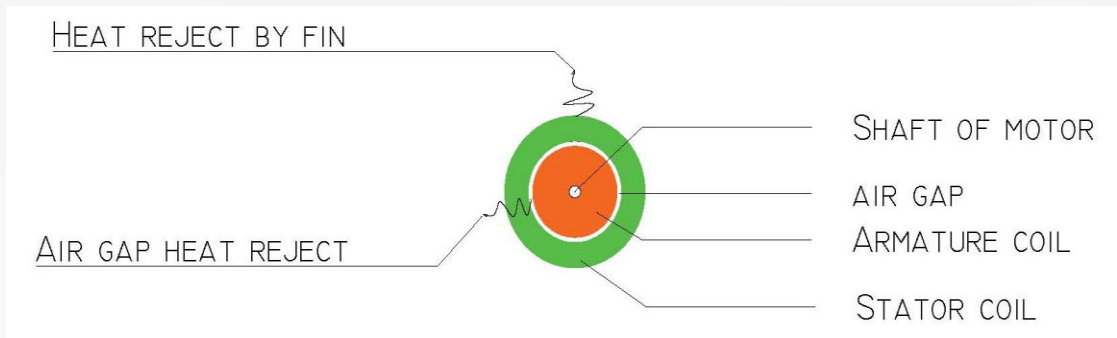


Figure 1 section of electric motor

Section of traction motor normal type show in figure 1 the heat from motor's operation is dissipated by two channels one is by air is blown out through the gap between the armature and the stator it called air gap and the other is the heat dissipated through the fins of the motor jacket. However, another high heat generation is the armature coil. In particular, the copper coil near the motor shaft cannot be cooling. The coils near the shaft have high level of heat. Therefore, this study focuses on solving the problem of heat pooling that occurs on the armature coil near the shaft of tracking motor.

The low-speed rotating heat pipe (LSRHP) are highly efficient and has excellent properties of heat transfer which has a simple structure component. Using heat pipe to transfer the heat is widely selected by various studies. Within the liquid container and wicking structure are evaporator section and condensation section the heat pipe transmits heat by absorbing heat as the working fluid evaporates to the evaporator and releasing heat as the vapor condenses at the condenser. Heat pipe which depends on various flow mechanisms to return the working fluid from the condenser to the evaporator. For example, by using gravity. Centrifugal force seems to be suitable for rotary devices and heat pipe based on centrifugal force. The work of rotating heat pipe will work better than a simple heat pipe is that it does not require a wick structure to work.

The low-speed rotating heat pipe is a two-phase closed system thermosyphon in which the vapor from heat input its flown by pressure difference from evaporator section through an adiabatic section to condenser section when heat reject at the condenser section the vapor is condensate returns to evaporator by hydrostatic gradient in the film caused by the centrifugal force to the working fluid liquid flow by taper surface. Shaft, having a taper between a condenser section and adiabatic section its axial length and filling by working fluid. As show in fig 2, the rotating heat pipe have three sections: the evaporator region, an adiabatic section, and the condenser respectively.

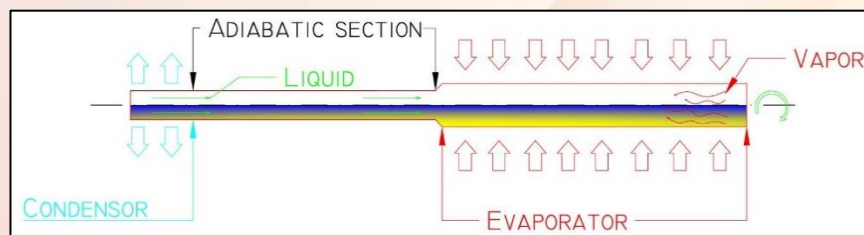




Figure 2 Schematic of rotating heat pipe.

In axial rotating heat pipe low speed, studies were conducted in the section on how to conduct an experiment. This study method has been previously implemented.

2. Research Objectives

2.1 To develop and increase the efficiency of heat dissipation from armature buoys of electric motors by using rotating heat pipes.

2.1 To study the behavior of heat transfer of rotating heat pipes by using water as a working fluid.

3. Research methodology

The development of heat dissipation from electric motors used in vehicles has been extensively studied which have different characteristics according to the type of cooling fluid such as air [1], water, nanofluid and cooling by oil. Etc., each type has advantages to each other. C.W. Leng [2] measured temperature at different position of DC motor of Hong Kong's trains Kowloon Canton Railway Corporation (KCRC) while running normal case from Hung Hom to Lo Wu a total of 12 stations. Both departure and arrival round with the conditions of difference motor loads of 30 tons for departure and 90 tons for arrival. Temperature behavior inside the motor at main pole of stator coil is higher than other positions and has a swinging curve. However, they do not measure the temperature at the rotor. D. H. Lim and S. C. Kim [3] they conducted experiment and numerical methods for the cooling of motor driving the vehicle by means of supplying oil to flow shaft hole in order to spray oil to cool the rotor coil and stator coil surface. Found that using this spray oil provides better cooling performance. Moreover, the temperature distribution in the motor is also linear. T. David [4] the effect of the distribution characteristics of cooling oil flow rate, motor speed and temperature of the cooling oil effect the thermal characteristics of motor. The study found that the cooling oil flow rate has a profound effect on the performance of motor and rotational speed has small effect. However, it has a significant effect on the temperature at various position inside the motor. From such research [3, 4] it was found that the liquid in sprayed to reduce the inside motor temperature the efficiency of cooling is higher than the use of air cooling. Whereas, it is necessary to spray for the energy required to drive the liquid pump. what's more, there must be additional equipment to use for cooling. M. Xie [5] conducted an experiment to determine the different temperature at wall temperature between the evaporator section and condenser section of the rotating heat pipe. From the experiment it was found that heat pipe with ammonia filling to working fluid have a temperature difference is 4 °C for the case without the working fluid the temperature difference is 27 °C. the result of this experiment indicated that the rotating heat pipe filled with working fluid have a significantly higher heat transfer capacity than those without working fluid. F. Song [6] also studied the heat transfer in the evaporator section of the rotating heat pipe from experiment it was found that heat transfer in the evaporating liquid layer is natural convection. Therefore, the researcher has an idea to develop to increase the thermal



performance of the tractor motor of the train which focuses on the application of a rotating heat pipe to pour heat from the armature coil motor at a shaft of motor which no researcher has studied this issue before. The expected results of this research will generate new knowledge. Technical aspects of motor shaft cooling more than that it will also be able to increase life motor's cycle to be longer and not being damaged by overheat reason. The rotating heat pipe and non working fluid rotating heat pipe were tested by using the diagram show in fig 2, also used in Minghui Xie et al [7]. The low speed rotation heat pipe machined from prefabricated gavanized pipes. The pipe is connected by means of a coupling lacated between the evaporator section and adiabatic section and condensor area closed by fitting. The gavanize pipe supported by two ball bearings, and drive by motor speed controled by inverter are 50, 100 and 150 rpm respectively. The evaporator received the heat from a resistance induction heating 3,000 watt two unit long heating coil 300 mm and on the oustside we make a box for insulating cover the evaporation section expoximately 300 mm in length. After that, drill holes for insertion there were five thermocouper with a distance at 50 mm as shown in fig 2 (dimation multiplies by 10 centimeter). The heat transfer thought along low-speed rotation heat pipe (LSRHP) was removed from the end of pipe by air cooling being sucked in chamber by the exhaust fan. The end of condenser section has a fin radiator was using air flow through a fin by the convection of the heat reject. The temperature of the evaporator box was measured by thermocouple. The data of inside box and air temperatures was collected by data logger. The conditions test for the LSRHP with working fluid and without working fluid the same condition.

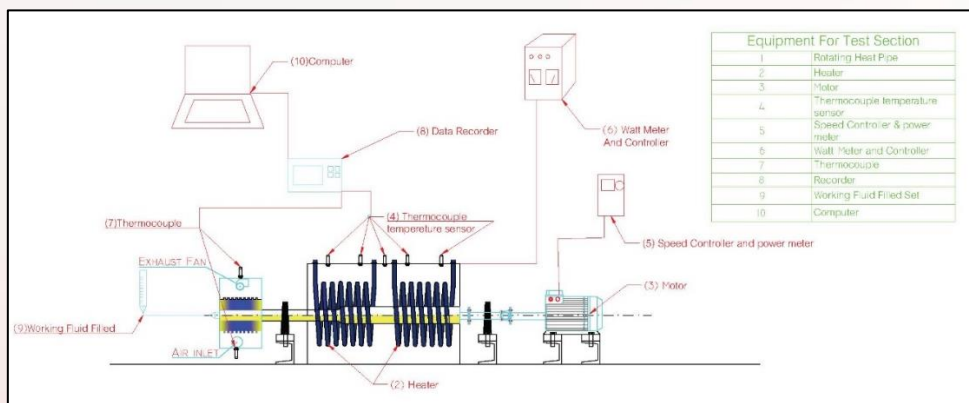


Figure 3 schematic of low-speed rotation heat pipe

The LSRHP experimental were performed. The LSRHP filling the working fluid by water. Working fluid filled 50% by volume. LSRHP with working fluid and LSRHP with out was the same physical size follow at the table 1 the thermocouple are installed by drilling holes in the steel box that is used to cover to prevent heat transfer from heater by using insulation on the steel wall. It is being used as a temperature measurement with the uncertainty of $\pm 15\%$ range of measure from 0 to 450 °C. The experimental rotating speed was 50, 100 and 150 rpm control by inverter and the heat flux used for evaporator space was 450 Watt by heater.

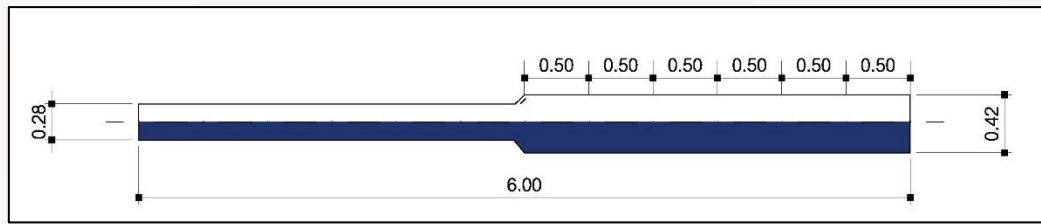


Figure 4 Dimensional of low speed rotating heat pipe show in (multiplies by 10 centimeters)

Table 1 dimensional and specifications of low-speed rotating heat pipe.

Descriptions	Material and detail
Over all length	600 mm.
Evaporation section	300 mm.
Adiabatic section	200 mm.
Condenser section	100 mm.
Material of LSRHP	Black Steel pipe SCH 40
Material of fin radiator	Aluminum machine
Diameter of evaporator	42 mm.
Diameter of condenser	28 mm.
Thickness of evaporator	3.2 mm.
Thickness of condenser	3.2 mm.
Working fluid	water
Temperature of air cooling	25 °C
Durations time	2,500 second.

4. Research Results

4.1 Effect of working fluid

Previous experiments have shown the studies of LSRHP with various equipment. This experiment focuses on the effect of LSRHP regarding working fluid and non-working fluid. According to fig 5, It shows the significant result of performance of LSRHP. It is clearly seen that there is a significant drop of temperature with working fluid condition. So, there is a convection coefficient of water evaporation and LSRHP performance shaping by working fluid. To illustrate, the maximum average temperature with working fluid is 90°C and without working fluid is 66°C fluid. Therefore, the different of average temperature between both conditions is 24°C.

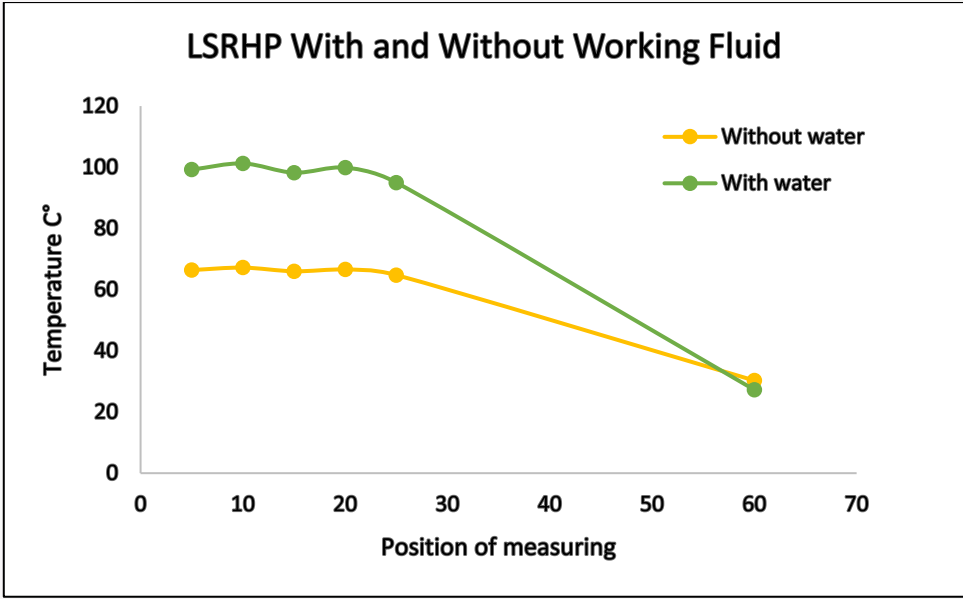


Figure 5 comparison of LSRHP with working fluid and without working speed 50 rpm and heat flux 450 W.

3.2 Effect of revaluations validates

There is no clear relationship between temperature level and duration time. According to fig 5, It can be seen that all level of rpm at 50, 100 and 150 rpm share the similar trend which is rising to 980 sec then steady drop. However, there is no correlation of level of rpm and temperature. As indicated in fig 5, 50 rpm has higher temperature than 100 rpm at 100°C and 60°C but 150 rpm also has higher temperature than 100 rpm at 80°C and 60°C.

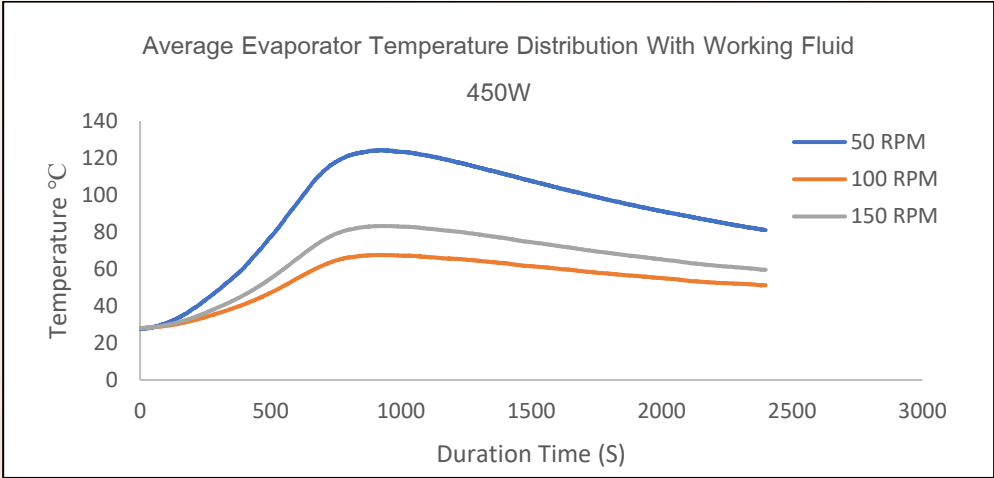


Figure 6 average Evaporator temperature distribution variation rotation speed constant heat flux around time.



3.3 Effect of speed affects to Q_{max}

In order to determine the efficiency of heat transfer from the motor shaft which has built an experimental set to be able to measure the rate of heated entering or exiting the heat pipe system by bringing insulation to cover the outside of the part to prevent heat loss from the system in this experiment. Heating coil was being used as a heat to the evaporator. Therefore, the heat transferred in to the evaporation section can be obtained from the equation (1).

$$Q_{in} = VI \quad (1)$$

When Q_{in} is the heat paid to the evaporator hear is the heat supplied to the heat pipe (W), V is the voltage supplied to the heater coil (Volt) and I is the current flowing through the coil (A) for cooling from the condenser used air at the room temperature by a fan to control the air to flow through the condensation. Therefore, the heat dissipated from the condenser can be obtained from equation (2).

$$Q_{cool} = \dot{m}C_p(T_{out} - T_{in}) \quad (2)$$

When Q_{cool} is the heat dissipated from the condenser (W) here it is defined as heat transferable. \dot{m} is the mass flow rate at which air flows through the fin radiator of condenser (kg/s). C_p is the specific heat of air ($kJ/kg.K$). T_{out} and T_{in} is the temperature of air out and in through the fin radiator of condenser ($^{\circ}C$).

In this experiment used LSRHP with water filling 50% by volume and without water filled by controlled heat input to 450 W and validation the speed of rotation from 50 to 100 and 150 rpm respectively it same one. Found that in Fig 7 show the heat transfer increases with the rotation speed of shaft increases. However, LSRHP without water found that it looks like an upside-down pan at 50 and 150 rpm are worth the Q_{max} is higher than 100 rpm which than 100 rpm which is still lower than the water filled type. When the speed is from 50 to 100 and 150 rpm. The heat transfer value is 1.88, 3.91 and 4.12 W respectively in case of filling water. However, the heat transfer value is 2.09, 0.61 and 2.26 W respectively in case of without water found that the speed of rotation from 100 to 150 rpm heat dissipation has only 5%.

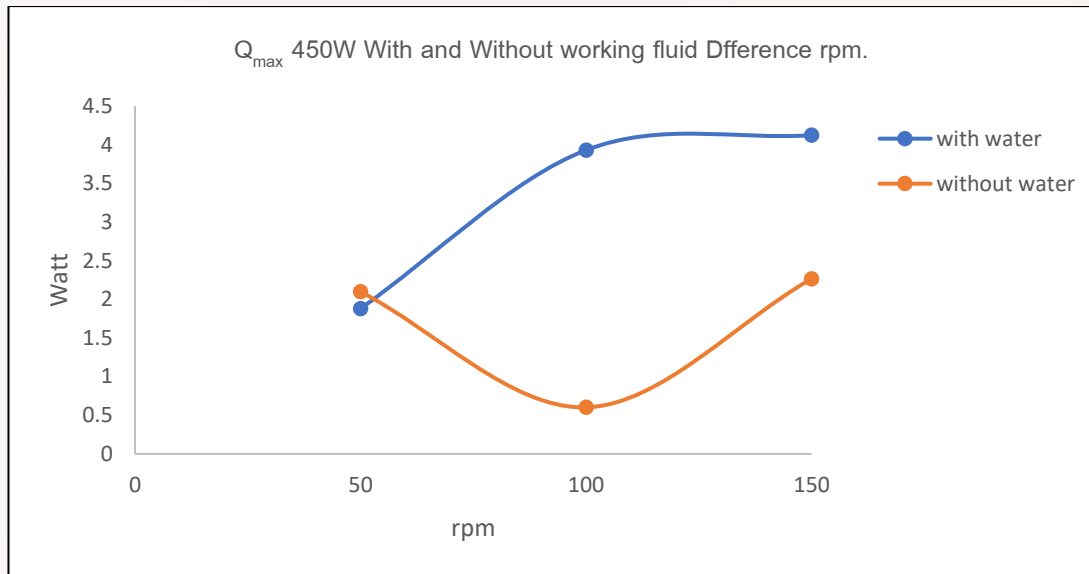


Figure 7 relationship between Q_{max} and rotation speed

5. Discussion

From the experiment to develop the heat dissipation from the shaft buoy of the train traction motor by using the rotating heat pipe instead of the original shaft. It can increase the efficiency of cooling at the motor shaft as follows.

5.1 The hollow shaft type filled with 50% water will dissipate heat 2 time better than non-water type shaft.

5.2 The maximum average temperature of with working fluid is 90°C while 66°C with non- working fluid.

5.3 The heat transfer value is 2.09, 0.61 and 2.26 W respectively in case of without water found that the speed of rotation from 100 to 150 rpm heat dissipation has only 5%.

6. Conclusions

From the experiment to develop heat dissipation from the train traction motor shaft by using a Low-speed rotating heat pipe instead of the original shaft and increase the cooling efficiency of the traction motor shaft can be summarized as follows.

There is a significant different of performance at 50% regarding working fluid. To summarize, Low speed rotating pipe with working fluid has average temperature is 90°C but low speed rotating heat without working fluid has 60°C. The higher temperature leads to better working performance of heat transfer.

7. Recommendations

The recommendation of this research is followed.

7.1 In further research need to be pressure measurement should also be made within the pipes to add to the analysis.



7.2 Since the value of Q_{max} increases with the rotational speed, therefore the effects of rotation on heat transfer characteristics should be analyzed.

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Poster Presentation Session



The Development of Mathematics Learning Activity Set Emphasizing Problem-Solving Competencies based on Polya's Concepts with the Bar Model

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Abstract

The purposes of this study were to develop of Mathematics learning activity set emphasizing problem-solving competencies based on Polya's concepts with the Bar Model of grade 6 students and to study the result of developing mathematical problem-solving competencies based on Polya's concepts with the Bar Model. The sample group from cluster sampling were 19 students from grade 6 students, first semester, academic year 2022, Wat Tharue School, Rachaburi. The tools used for data collection were step-by-step learning plan of Polya with the Bar Model, ratio and percentage questions, step-by-step learning management activity set of Polya with the Bar Model, and mathematics problem solving performance test. The statistical tools used for data analysis were percentage, mean and standard deviation. The result found 1) the set of mathematics learning activity has an efficiency value of 80.43/82.29, which is highly effective according to the criteria of 80/80, and 2) mathematical problem-solving competency of all students perform at an excellent performance level.

Keywords: Activity set, Mathematics learning, Polya's concepts problem-solving performance with the bar model.

1.Introduction

There are many ways to solve Mathematics problems. An effective way to solve a problem is to draw a picture of a box that relates to what the problem is given to and what the question asks. It is easier to think according to the text in the problem. In any case, it corresponds to the functioning of the brain. This way of writing the picture of the box is something that Mathematics teachers must know, understand, be familiar with and skilled, especially primary school teachers in Singapore. There is a reference to the results of international assessments comparing students' competency to solve mathematical problems, known as the Bar Model (Surat Inthasang, 2015, 27). The problem-solving model is based on the concepts of Polya (Polya, 1957, 16-17)



which is the most well-known and widely used fundamental step of problem-solving. There are 4 steps in total. Step 1 understanding the problem is to read the problem at least twice and analyze what the problem defines, and what the question is. This leads to create the Bar Model image. Step 2 developing a plan is to plan the bar model drawing. The purpose is to find a solution and write a symbolic sentence. Step 3 shows how to do and calculate (carrying out the plan). And step 4, check how to do it (looking back). Have students draw a schematic to interpret the problem. The purpose is to lead to understanding and visualization of problem solving. For this reason, the researcher realized the problem state and the need to develop of Mathematics learning activity set emphasizing problem-solving competencies based on Polya's concepts with the Bar Model of grade 6 students were used as a guideline for improving and developing the effective student-centered learning in mathematics.

2. Research Objectives

2.1 Develop a mathematics learning activity set emphasizes on competency of focusing on problems solving following Polya's concepts with Bar Models of grade 6 students.

2.2 Study the result of developing competency of focusing on problems solving followed Polya's concepts with Bar Models of grade 6 students.

3. Research Methodology

The sample group was grade 6 students who live in Phaeng Phuai Sub district, Damnoen Saduak District, Ratchaburi Province. This consists of Wat Tha Rua School, Ban Nong Kai Kaew School, Wat Nakkammaram School, and Wat Sidaram School (Thep Choei Prachanukul). The sample used in this research were 19 students of grade 6 students of Wat Tha Ruea School and studying in the first semester of the 2022 academic year-selected by cluster sampling.

There are 3 plans, 6 hours of step by step learning management plan of Polya with the Bar Model about ratio and percentage problems of grade 6 students. Data collection was conducted during the 16-23 September 2022.

There are 3 sets of step by step learning activity of Polya with the bar model about ratio and percentage problems of grade 6 students.

Step by step competency test for solving learning management problems of Polya with the bar model about ratio and percentage problems is for grade 6 students.

The step-by-step process and quality check of creating a learning management plan of Polya with the Bar Model about ratio and percentage problems of grade 6 students, can be shown as follow. 1) Study documents and research related to the principle of creating learning management plans in sequence- step by step of Polya with a bar model on the problem of ratio and percentage, including studying the basic education core curriculum, B.E. 2551, mathematics learning group, grade 6 students. 2) Analyze the conformity of learning standards, indicators, content, learning objectives



and time spent on activity. 3) Create a sequential lesson plan of Polya with the bar model about ratio and percentage problem which is consistent with the set of learning management activity in step by step of Polya with the bar model on the problem of ratios and percentages of grade 6 students, 3 plans of learning management. 4) Present to the thesis advisor to inspect the accuracy and correct any deficiencies according to the recommendations. 5) Bring the updated map to three experts in mathematics teaching, teaching techniques, and measurement and evaluation. The purpose is to check the content validity and to find the index of item objective congruence (IOC), which the calculated value from 0.50 and is considered consistent within the acceptable criteria. The results of the consideration of all 3 experts found that, the index of all 3 learning management plans was equal to 1.00. 6) Bring the modified learning management plan to use with high school students grade 7, at Wat Namphu School (The Office of the Welfare Lottery 54) conducted an experiment between 1-8 September 2022 to verify suitability. The result is suitable for practical use.

The creation of the set of mathematics learning activity according to Polya's concepts using the Bar Model about ratio and percentage problems of grade 6 students has the steps as follow. 1) Study document and research related to the principles of creating a set of step by step of learning management activity of Polya's concepts with the Bar Model about ratio and percentage problems, study of the basic education core curriculum, 2008 of the mathematics learning subject group, including analyzing the consistency of learning standards, indicators, content, and learning objectives. 2) create the set of mathematics learning activity according to Polya's concepts using the Bar Model about ratio and percentage questions of grade 6 students according to the analytical table. The developed activity set contains important components: the teacher's handbook contains instructions for using the activity pack, its objectives, details of the structure of the activity pack, the relationship between activity set and step-by-step learning plans, the method for using the content activity packs and learning activities, measurement and evaluation, and skill exercises. 3) Bring the created learning activity set to the thesis advisor to verify the accuracy and to correct the flaws according to the suggestions. 4) Present the revised activity set to 3 experts who specialize in creating mathematics learning activity set, organizing math learning activities, and measuring and evaluating. This is to determine the appropriateness of the set of activities in terms of content fidelity. Then find the consistency index. The result is that the index of item objective congruence of all 3 activity sets is equal to 1.00. 5) Improve the activity set to be more complete and suitable according to the advice of experts and apply to trial with high school students, grade 7 at Wat Namphu School (Welfare Lottery Office 54) This is to develop a set of activity that are effective and appropriate. The experimental procedure is as follows. The 1:1 experimental stage has an efficiency value of 77.68/73. The 1:10 experimental model was conducted with 10 high school students, grade 7 using a simple random sampling method consisting of 3 weak students, 4 intermediate students, and 3 strong students. The result is an



efficiency factor of 77.86/78.44. The third experimental stage, field experiment with high school students, grade 7 at Wat Namphu School (The Office of the Welfare Lottery 54) 30 people. The performance value is 80.43/82.29 6). Then improve the activity set to be more complete to be used in practice with the sample group.

The creation procedure of a mathematical problem-solving ratio and percentage of primary school student grade 6. 1) Study content of ratio and percentage problem of primary school students, grade 6 then conduct the objective. 2) Create a mathematical problem-solving competency test covering content and learning objectives about ratio and percentage problems of grade 6 students, subjective test, 5 items. 3) Bring the created mathematical problem-solving competency test to the advisor to review and correct any deficiency as suggested. 4) Bring the revised mathematical problem-solving competency test and present to 3 experts. This is to determine the suitability of the activity set in terms of content fidelity and then to determine its consistency index. The results of the consideration of all 3 experts found that the index of item objective congruence of all 3 activity sets was equal to 1.00. 5) Take the validated and revised mathematical problem-solving competency test to use with high school grade 7, 30 students, at Wat Namphu School (Office of the Welfare Lottery 54). 6) Analyze the results of mathematical problem-solving performance for the difficulty index by selecting items with difficulty between 0.2-0.8 and select index of discrimination from 0.3 or higher to use by selecting 2 items of a subjective test by assessing process skills, including calculation and problem solving. 7) After revising and selecting the mathematical problem-solving competency test, create the complete mathematical problem-solving competency test.

From the development analysis of a mathematics learning activity set emphasizing problem-solving competencies based on the concepts of Polya with Bar Model of primary school students, grade 6 by using the efficiency of the activity set by percentage, and the results of developing the mathematical problem solving competency by using the percentage criterion, the levels of competency were 80.00–100.00 percent in excellent performance, 60.00–79.99 percent in good performance, 40.00–59.99 percent in fair performance and 00.00–39.99 percent in the non-efficacy level.

4. Research Results

The research results can be summarized according to the objectives as follows:



Table 1

Results of the development of mathematics learning activity set emphasizing problem solving competencies based on Polya's concepts with a bar model on the subject of ratio and percentage problems.

Test	n	Full score	\bar{X}	S.D	Percentage
Exercise 1	30	12	9.60	2.10	80.00
Exercise 2	30	36	28.93	6.75	80.37
Exercise 3	30	32	26.27	9.65	82.08
Exercise 4	30	48	38.47	7.11	80.14
Exercise 5	30	48	38.47	7.69	80.14
Exercise 6	30	48	38.43	2.56	80.07
Total mark during class	30	224	180.17	25.75	80.43
Total mark after class	30	32	26.33	2.83	82.29

From the data in Table 1, it found that the developed activity set had the process efficiency of 80.43 and the result efficiency was 82.29, which was higher than the established criterion of 80/80. It indicates that the process efficiency of the activity set was higher than the criterion by 0.43 percent and the result efficiency was higher 2.29 percent criteria.

It can be concluded that the developed activity set has an efficiency of 80.43/82.29, higher than the established criterion of 80/80. It shown that the mathematics learning activity set emphasizing problem-solving performance according to Polya's concepts with Bar Model on the subject of ratio and percentage problems for grade 6 students had the efficiency as set and could be used for learning and teaching management.



Table 2

The results of competency in mathematics solving problems according to Polya's concepts with Bar Model about ratio and percentage of primary school students grade 6

Number	The competency of mathematics solving problem according to Polya's concepts with Bar Model			
	Full score	Score achieved	Percentage	Competency
1	32	30	93.75	Excellent
2	32	28	87.50	Excellent
3	32	29	90.63	Excellent
4	32	28	87.50	Excellent
5	32	31	96.88	Excellent
6	32	30	93.75	Excellent
7	32	28	87.50	Excellent
8	32	27	84.38	Excellent
9	32	26	81.25	Excellent
10	32	29	90.63	Excellent
11	32	30	93.75	Excellent
12	32	28	87.50	Excellent
13	32	30	93.75	Excellent
14	32	30	93.75	Excellent
15	32	28	87.50	Excellent
16	32	29	90.63	Excellent
17	32	28	87.50	Excellent
18	32	27	84.38	Excellent
19	32	30	93.75	Excellent
Total	32	28.74	89.80	Excellent

According to Table 1, the results of data analysis of the results of developing competency in solving mathematical problems according to Polya's concepts with Bar Model about ratio and percentage of grade 6 students that receive learning activity through a learning management plan with a set of learning activities, it found that the use of competency test to solve learning management problems in order to step by step resulting in the development of competency in solving mathematical problems is at an excellent for 100 percent of grade 6 students.

5. Discussion

The set of activity learning emphasizing on mathematics solving problem according to Polya's concepts has the competency as 80.43/82.29 that high performance



according to the 80/80 criterion because they are sets of learning activities that allow students to do with the method of creating a bar model in every step. Step 1 Problem Analysis; students can analyze it visually and make it easier for them to understand. Step 2 Defining a solution to the problem; students can understand the problem-solving plan by using Bar Model to find ways to solve that problem. Step 3 Troubleshooting; students know ways to find answers by using Bar Model. As a result, students can find answers more easily. Step 4 Validate; students can create Bar Model to review their answers and verify their validity with the problem. This is in line with the research of Saran Prempreeda (2016, 11) who studied the development of skill sets for solving mathematical problems with Bar Model Theory for primary school students, grade 3. It found that the quality of the mathematics problem-solving skills set with bar model theory is very good. The efficiency of the skill set in solving mathematical problems with the Bar Theory performance model was 82.13/83.11 and the learning achievement of students who studied using the skill set in solving mathematical problems is higher than students studying by normal method, statistically significant was .05 level.

The competency development in solving mathematical problem according to Polya's concepts about ratio and percentage of the primary students, grade 6 found the performance development result is 100 percent, in the criteria of excellent performance. This is in line with the research of Chanathip Sangprasert (2018, 11) who studied the comparison of learning achievement in mathematics on the application of linear equations in one variable of grade 2 students that learned by using Polya's problem-solving concepts together with bar model drawing techniques and normal learning. It found that the learning achievement of the students who received the problem solving based on Polya's concepts combined with the bar model drawing technique was higher than normal learning. This consistent with the research of Patcharin Thitaya (2019, 18) has studied the development of mathematical problem-solving abilities by using Polya's problem-solving process in conjunction with TAI cooperative learning of grade 6 students. The research results showed that the development of the competency to solve mathematical problems by using Polya's problem-solving process and TAI cooperative learning, all students scored at least 80%, which is considered to pass the set criteria.

6. Conclusion

The set of mathematics learning activity emphasizing the competency to focus on solving problems according to Polya's concepts using the Bar Model about ratio and percentage of grade 6 students, the efficiency was 80.43/82.29 with high efficiency according to the 80/80 criterion. Mathematical problem-solving performance based on Polya's concepts with the Bar Model about the problem of ratio and percentage of grade 6 students, found 100 percent of students perform at an excellent performance level.



7. Recommendations

7.1 Because some learning activity steps, students may take time longer to complete activities, teachers may be able to flexible time as appropriate the students will be able to do the activities to the fullest.

7.2 There should be research study to develop the competency to solve mathematical problems with Polya step-by-step of learning activity with the bar model, in addition to a variety of cooperative learning techniques such as the organize learning using the TGT technique in conjunction with the KWDL technique and the STAD technique to promote collaborative learning among students.

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Anxiety in English Oral Presentations of Thai EFL Students

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Abstract

The purposes of this study were 1) to investigate the anxiety level in the pre-presentation stage and 2) to explore the anxiety level in the while-presentation stage. The participants were 49 English for Business Communication students enrolling in English for Business Presentation course, second semester, academic year of 2022. The research instruments were questionnaires and interviews on anxiety level in English presentation. The questionnaires were distributed to the samples and the data were collected. The data were analyzed by using descriptive statistics including mean and standard deviation. The results showed that the anxiety level in the pre-presentation and the while-presentation stages were at a high level. The participants felt anxious if they forget what they have prepared most and they were also nervous when someone asks what he or she could not answer.

Keywords: Anxiety, English Presentation, English, English for Business Communication students

1. Introduction

Speaking is very essential for people nowadays as it is a mean for communication with people from different countries. In terms of teaching and learning English in a classroom, students who study English as a foreign language (EFL) are required to master speaking skills. For example, they must speak English with foreign teachers in the classroom. Also, there are many courses that provide students' communication skills, and they must use speaking skills in different courses concerning with English speaking in a specific purpose. Moreover, they must prepare themselves to be proficient in speaking for their future careers and education.

Nevertheless, EFL students are not confident enough to speak English inside and outside the classroom. Although they have studied English for many years in high school, they still feel uncomfortable to have conversations with teachers or foreigners. Most students understand what speakers say but still cannot speak with them. According to Horwitz, Horwitz, and Cope (1986), learning a foreign language in a classroom is quite stressing as learners lack the ability to express their opinion freely. Moreover, Azhar (2017) points out that there is a negative relation occurring. As a result, the more learners feel anxious, the more they lack the confidence to speak.



This might be due to the fact that students still have problems in speaking including the lack of knowledge and skills in English. For example, students lack the necessary vocabulary to use in speaking, and they have little knowledge in grammar. Moreover, they lack opportunity to practice speaking as the environment or context doesn't allow them to use English in daily life. Especially, students lack motivation in practicing their speaking skills although there are many ways to develop their skills by themselves. As a result, teaching and learning speaking skills are still problematic and these make students anxious when speaking English in class.

Many researchers have conducted studies concerning learners' anxiety. Kurakan (2021) studied the anxiety of 72 Engineering students in English presentation course using questionnaires and interviews. It was found that the anxiety level was at a moderate level, and the causes were from the lack of vocabulary and grammar knowledge. Kalra and Siribud (2020) investigated problems in public speaking anxiety encountered by Thai EFL students. The instruments were classroom observation, semi-structured interview, and questionnaire. The results revealed that anxiety in learners affected self-confidence, self-esteem, risk-taking ability, and ultimately hampers proficiency in the foreign language. Mhuentoei (2021) examined level, factors and sources of freshmen's anxiety in a Thai University. Mixed method was used for data collection. It was found that most students have high anxiety level, and the factors of anxiety were students' confidence and their sources were lack of confidence. Pruksaseat (2022) studied students' speaking anxiety in virtual classroom in a Thai University. The questionnaires and semi-structured interviews were employed for data collection. The results revealed that the anxiety was caused by limited vocabulary, fear of wrong pronunciation, inability to process thoughts into words, unpleasant psychophysiological symptoms, fear of negative evaluation, and fear of miscommunication. Anggita and Suwartono (2002) studied factors affecting anxiety and how the students handling the anxiety. Questionnaires, interviews and observations were used to gather data from English Education students. The factors affecting students' presentation anxiety were internal factor including afraid of making mistakes, lack of preparation, limited vocabulary, low self-confidence, and embarrassment, and external factor including classmates and lecturer.

In the context of Sakon Nakhon Rajabhat University, English for Business Communication students are required to develop their English-speaking skills through several courses in order to use in their future career. However, most students still feel anxious when they speak English with teachers or foreign teachers. Especially, English for Presentation in Business Contexts is a course that requires students to practice more advanced speaking skills. They must speak in front of the class individually. This certainly makes them feel anxious when speaking in front of many audience. Therefore, this study aims to investigate the anxiety of the students before and during presentation. The results will provide more understanding on the reasons students feel uncomfortable in order to learn characteristics of anxiety and reduce it in the future.

2. Research Objectives

2.1 To study anxiety in the pre-presentation stage of English for Business Communication students.

2.2 To study anxiety in the while-presentation stage of English for Business Communication students.



3. Research Methodology

3.1 Participants

The participants in this study were 49 third year English for Business Communication students, Faculty of Humanity and Social Sciences, Sakon Nakhon Rajabhat University. They were enrolled in the course of English for Presentation in Business Contexts (31553604) in the second semester, 2022.

3.2 Research Instruments

The research instruments used in this study were questionnaire and interview form. The questionnaire was adapted from Kurakan (2021). It comprised of three parts including general information of the participants, the anxiety before the presentation which comprised of 12 items, and the anxiety during the presentation which comprised of 10 items. The interview form comprised of 3 questions asking about the anxiety in pre-presentation stage and while-presentation stage.

3.3 Data Collection

The researchers distributed the questionnaires to all participants outside the class. The participants were informed about the objectives of the study and the items in the questionnaires. They spent about 5-10 minutes completing the questionnaires. Then all questionnaires were collected back for further analysis. The interviews were conducted with 3 participants, and they were asked the questions on the pre- and while-presentation stages.

3.4 Data Analysis

The statistics used to analyze the results of this study was descriptive statistics, including mean and standard deviation. The interpretation of the problems in using English from the questionnaire was as follows.

Anxiety Level Ranges

Mean Range Anxiety	Level Interpretation
4.51 – 5.00	Very high anxiety
3.51 – 4.50	High anxiety
2.51 – 3.50	Moderate
1.51 – 2.50	Low anxiety
1.00 – 1.50	Very low anxiety

For the interview, the semi-structured interviews were used to find qualitative data. Content analysis was applied to interpret the data from the semi-structured interviews.

4. Research Results

The results were divided into two parts. The first part was the level of anxiety in pre-presentation stage. The second part was the results of the level of anxiety in while-presentation stage. The results were as follows:

4.1 Results from Questionnaires

4.1.1 The Level of Anxiety in Pre-Presentation Stage

The results of anxiety in pre-presentation stage from 49 respondents done by English for Business Communication students were shown in the following table.

**Table 1 Anxiety in Pre-Presentation Stage**

Situations of Anxiety	\bar{X}	S.D.	Level
I feel anxious ...			
1. if I forget what I have prepared to say.	4.27	1.02	Very high
2. while preparing for giving an oral presentation.	3.90	1.10	High
3. when thinking about an upcoming oral presentation.	3.94	1.03	High
4. then, breathe faster before giving an oral presentation.	3.71	1.19	High
5. when I see the word “oral presentation” on a course outline.	4.04	1.10	High
6. my heart beats fast when I just start an oral presentation.	3.86	1.06	High
7. while waiting to give my oral presentation.	3.90	1.12	High
8. while sitting in the room just before starting an oral presentation.	3.73	1.11	High
9. when the teacher assigns an oral presentation task.	3.65	1.25	High
10. when the teacher announces the date of an oral presentation.	3.63	1.20	High
11. then, sweat just before starting an oral presentation.	3.18	1.47	Moderate
12. and falling asleep difficultly the night before an oral presentation.	3.20	1.41	Moderate
Total	3.75	1.17	High

As shown in Table 1, the overall mean score of anxiety of the respondents in pre-presentation stage was at a high level ($\bar{X} = 3.75$). The result indicated that the item with the highest level of anxiety was I feel anxious if I forget what I have prepared to say ($\bar{X} = 4.27$). The item with the second highest level of anxiety was I feel anxious when I see the word “oral presentation” on a course outline. ($\bar{X} = 4.04$), and the item with the third highest level of anxiety was I feel anxious when thinking about an upcoming oral presentation ($\bar{X} = 3.94$).

4.1.2 The Level of Anxiety in While-Presentation Stage

The results of anxiety in while-presentation stage from 49 questionnaires done by English for Business Communication students were shown in the following table.

Table 2 Anxiety in While-Presentation Stage

Situations of Anxiety	\bar{X}	S.D.	Level
I feel anxious ...			
1. when someone asks me about a topic I don't know.	3.82	1.19	High



2. if I forget facts while giving an oral presentation.	4.14	1.14	High
3. when I make a mistake while giving an oral presentation, I find it hard to concentrate on the following parts.	3.86	1.17	High
4. and confused when giving an oral presentation.	3.51	1.31	High
5. so I perform poorer on an oral presentation.	3.78	1.25	High
6. when only a little time remains in the presentation.	3.69	1.25	High
7. so my heart beats very fast while doing an oral presentation.	3.63	1.24	High
8. and powerless to speak during an effective oral presentation.	3.12	1.38	Moderate
9. so my hands shake when I am giving an oral presentation.	3.43	1.37	High
10. so my body parts tense up while giving an oral presentation.	3.18	1.44	Moderate
Total	3.62	1.27	High

As shown in Table 2, the overall mean score of anxiety of the respondents in while-presentation stage was at a high level ($\bar{X} = 3.62$). The result indicated that the item with the highest level of anxiety was I feel anxious if I forget facts while giving an oral presentation ($\bar{X} = 4.14$). The item with the second highest level of anxiety was I feel anxious when I make a mistake while giving an oral presentation, I find it hard to concentrate on the following parts ($\bar{X} = 3.86$), and the item with the third highest level of anxiety was I feel anxious when someone asks me about a topic I don't know ($\bar{X} = 3.82$).

4.2 Results from the Interviews

The results from the interviews of anxiety in pre-and while-presentation stages from 5 English for Business Communication students were as follows.

4.2.1 The Anxiety in Pre-Presentation Stage

The anxiety in the pre-presentation from interviewing all participants was as followed.

“I feel nervous if I cannot remember all of what I have to say, and I am afraid that I cannot pronounce words correctly.” Participant A.

“I think I feel a bit nervous if I cannot pronounce words or phrases correctly. And I am afraid that I cannot give the presentation in a correct order.” Participant B.

“I feel anxious that during the presentation, I cannot pronounce some vocabulary correctly. Moreover, I am not confident in stressing words during my presentation.” Participant C.

“I am afraid of making mistakes. Especially, I am afraid that I have wrong pronunciation. And I cannot order my presentation correctly. Participant D.

“For the upcoming presentation, I feel nervous because I cannot remember all of the contents to present. Participant E.



According to the findings, most of the participants felt anxious about their pronunciations. Moreover, some of them felt nervous if they could order their presentation chronologically, and they were afraid that they were unable to memorize what they had to say.

4.2.2 The Anxiety in While-Presentation Stage

The anxiety in the pre-presentation from interviewing all participants was as followed.

“I feel worried about how to pause between sentences in my speech. And I also feel nervous about how to use gestures during my presentation.” Participant A.

“During presentation, I am worried about using my tone and my gestures. Also, I feel nervous when the audiences stare at me.” Participant B.

“I am afraid if I pronounce words incorrectly. And then I cannot continue my presentation.” Participant C.

“I feel so nervous when I pronounce words incorrectly. And I am worried that I cannot create the sentences correctly. Moreover, I feel anxious whenever people stare at me, and some audiences do not pay attention to what I present.” Participant D.

“During my presentation, I am a bit nervous when audiences talk and don't pay attention to what I say.” Participant E.

According to the findings, most of the participants felt anxious about their pronunciations. They are afraid that they could pronounce words correctly. Moreover, some of them felt nervous about the audience. They felt anxious when the audience stared at them and did not listen to what they presented.

5. Conclusions and Discussions

Results of the anxiety in pre-presentation stage of English for Business Communication Major students indicated that the level of anxiety was at a high level. The aspect with the highest level was that they felt anxious if they forgot what they had prepared for a presentation which correlated with Kurakan (2021)'s study indicating that the participants felt most anxious if they forgot the contents in their presentation. This might be due to the fact that students did not have enough time to prepare themselves and memorize the contents before a presentation so that they might forget what they've prepared during the presentation. Moreover, the students felt anxious when they were introduced the course description. This correlated with the study of Mhuentoei (2021) finding that students worry about the consequences of failing their English class. This course was quite different from other speaking courses as the students must speak in front of the class with a large audience. This is why they feel nervous about the course.

In terms of the anxiety in while-presentation stage of English for Business Communication Major students, results indicated that the level of anxiety was at a high level. The participants felt most anxious if they forget the information while they are giving a presentation. This correlated with the study of Anggita and Suwartono (2020), which found that one reason that the participants felt anxious during the presentation is the lack of practice and preparation, so that the participants might forget the information



to present although they are well-prepared. Therefore, the students are afraid of forgetting what they have prepared. Another anxiety of the participants during the presentation was that they felt anxious if someone asked what they didn't know, which correlated with Kurakan (2021)' research. This might be due to the fact that the participants had little knowledge or information about their presentation. Moreover, it is difficult for them to answer the questions as they haven't prepared the answers for the questions being asked. Moreover, from the interview, the participants felt uncomfortable about the audience such as staring at the presenter, not paying attention to the presentation, and talking during presentation. This correlated with the study of Anggita and Suwartono (2002) finding that there were external factors affecting anxiety of the students such as lecturers and classmates.

Interestingly from the interviews in both pre-presentation stage and while-presentation stage, most of the participants reported to be nervous concerning their pronunciations and sentence orders. In other words, the students in this study felt anxious to make mistakes, especially mispronunciation. Similarly, Mhuentoei (2021) and Kalra and Siribud (2020) found that most students are afraid of making mistakes during presentation.

6. Recommendations

For general recommendations for teaching and learning in English presentation courses, students must prepare themselves in advance according to the given deadline. Especially, teachers must give appropriate length of time to students to practice their presentation, and teachers must follow up what students have prepared to prevent them from preparing near the deadline. Teachers must introduce ways to prevent forgetting the contents to the students. For example, students make lists of what to speak next. They also learn how to cope with the situation of forgetting the contents during the presentations. In terms of answering the audience's questions, teachers or students must ask what are in the presentation.

For the research recommendations, further studies should have more research instruments for collecting data from several sources such as class observations. Moreover, data can be obtained from non-English major students to compare the level of anxiety. Thirdly, further studies should examine ways to reduce students' anxiety and investigate how to deal with the anxiety during presentation.

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Dental biofilm cariogenicity changes under the effect of stainless steel versus elastomeric ligatures in fixed orthodontic patients

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Abstract

This study aimed to evaluate the short-term effects of stainless steel and elastomeric ligatures on dental plaque pathogenicity in fixed orthodontic patients. 70 participants were enrolled in the study (57 females, 13 males) aged between 13 and 57 years. Plaque staining with the 3-tone plaque disclosing gel were assessed in all patients at T1 (Baseline). The patients were randomly allocated into the stainless steel ligature group (n=35, ages 13-43 years) and the elastomeric ligature group (n=35, ages 15-53). The second data set of plaque staining were collected about 4 weeks at T2 (Follow-up). For the stainless steel ligature group, the highest (50%) of immature plaque was observed, compared to mature (26%) and acidogenic (8%) plaque at T1 ($p < 0.05$). At T2, immature plaque (79.16%) was increased whereas mature (20%) and acidogenic (0%) plaques were decreased ($p < 0.05$). For the elastomeric ligature group, the highest percentage (54.16%) was observed in acidogenic plaque while percentage of mature plaque was 25% and the percentage of immature plaque was 13.63% at T1 ($p < 0.05$). A decrease in the acidogenic plaque (7.14%) was found whereas an increase in immature (64%) was observed at T2 ($p < 0.05$). In contrast, no significant changes in mature plaque (29.6%) was found in Elastomeric group ($p > 0.05$). Elastomeric ligature caused higher in acidogenic plaque, compared to stainless steel ligature.

Keywords: Dental plaque, Stainless steel ligature, Elastomeric ligature, The 3-tone plaque disclosing gel



1. Introduction

Dental plaque is the community of microorganisms found on a tooth surface as a biofilm, embedded in a matrix of polymers of host and bacterial origin. It is considered to be the primary etiologic factors for dental caries (Philip D. Marsh, 2006). Its development has been associated with individual and environmental factors including tooth related factors, quality of saliva, fluoride exposure, sugar consumption, oral hygiene and the composition of oral flora (Pitts et al., 2017).

Previous publications revealed moderate evidence that the presence of fixed appliances influences the quantity and quality of oral microbiota (Freitas, Marquezan, Nojima Mda, Alviano, & Maia, 2014). However, the effect of ligation types on dental biofilm cariogenicity are still controversy in the result (Skilbeck, Mei, Mohammed, Cannon, & Farella, 2022). Recently a systemic review revealed that there were no significant differences in biofilm formation between ligation and self- ligation, but that stainless steel ligation (SSL) ligation was less susceptible to biofilm formation than elastomeric ligation (EL). It was noticed that for the total bacterial count from plaque, there was a small but statistically significant difference between SSL and EL ligation types at every time point from four to 61 weeks. For plaque index, there was a 12% difference between the two ligation types (Skilbeck et al., 2022). One of the studies demonstrated that there were increased numbers of microorganisms around EL ligation compared to SSL ligation but that this was not reflected in a shift to more cariogenic species (Forsberg, Brattstrom, Malmberg, & Nord, 1991). However, a split-mouth study found no significant differences between EL and SSL wire ligation with regard to microbial growth (Turkkahraman H et al., 2005). Another study also found no significant differences between EL and SSL ligation where the presence of plaque was quantified by spectrophotometry and morphologic observations by scanning electron microscopy (SEM) (Condò R, Casaglia A, Armellin E, Condò SG, & Cerroni, 2013).

Although numerous studies have evaluated the effect of fixed orthodontic appliances on plaque accumulation, no study has been reported on their effects on ecological changes in plaque. Previous reports demonstrated a significant increase in cariogenic bacteria including *Streptococcus mutans* and *Lactobacilli* in subjects treated with fixed appliances (Contaldo et al., 2021). By acknowledging that *Streptococcus mutans* is no longer regard as sole or necessarily dominant pathogens in dental caries, it follows that assessment of dental plaque should be based on acid production by fermentation under conditions of sucrose challenge. Apply to “ecological plaque hypothesis” concept to the issue of pH within the dental plaque, it is suggested that the low pH environment generate from carbohydrate metabolism is the major factor responsible for the shifts observed in dental plaque bacteria with high carbohydrate diet (P. D. Marsh, 2006; Pitts et al., 2017).

Recently, a three color disclosing dye (GC TriPlaque ID Gel TM, GC Corporation, Tokyo, Japan) has been developed. The gel could determine the pathogenicity of dental plaque. Pink color indicated newly formed dental plaque aged



less than 1 day old, because of dye staining on the surface. Older plaque stained blue/purple because of trapping of blue dye within the three dimensional substructure of dental plaque. Light blue revealed areas of acidogenic plaque due to high caries risk sucrose challenge. Blue (Brostek & Walsh, 2014). Additionally, it was found that areas with light blue staining have high levels of mutans streptococci, which represent dysbiosis in the dental plaque, and greater caries risk (Jyanthi et al., 2015).

2. Research Objectives

The aim of this study was to compare dental plaque pathogenicity between patients treatment with stainless steel - and elastomeric - ligated conventional brackets.

3. Research Methodology

3.1 Study design and participants

This study was approved by the Committee for Ethics in Human Research of the Walailak University (protocol number: WUEC 20-227-02). Patients in active treatments between October 25, 2020 and April 7, 2021 in a private orthodontic clinic in Samutprakarn province, Thailand were chosen for the study. Sample size of each group was calculated using the computer application G*power 3.1.9.4 to detect the mean difference in the percentage of acidogenic plaque between two time points. For paired Student t- test, an effect size of 0.5 (Cohen's d) with $\alpha = 0.05$, power of 0.8 suggest 26 samples in each group (Cohen, 1988). It may optimistic to assume that the percentage of acidogenic plaque would follow a normal distribution across the treatment groups. Therefore, to maintain the same power, when parametric assumptions are violated and a nonparametric test is used, a rule of thumb is to add 15% to the sample (Lehmann, 1998). This finalized sample size to 30 per group. Considering a dropout rate of 10% the sample size required in each group is at least 33 (Wang & Ji, 2020).

The subjects were randomly selected from 218 patients who met the following inclusion criteria (1) subjects in the follow-up study were 12 years of age or older at the start of treatment; (2) patients were treated with the same type of conventional preadjusted brackets (Roth type, Slot.022, Omni Arch, Tomy International, Tokyo, Japan) and the same company of convertible single buccal tube of first molar and buccal tube of second molar. (3) patients were excluded if salivary gland dysfunction, medicines and drugs with side effect on hyposalivation, or antibiotic therapy within 3 months prior to the study. (4) patients were excluded if present with C- chain and orthodontic accessory. All patients who visited the orthodontic clinic for their follow up during the 3 months period of the study and fulfilled the inclusion criteria were invited to participate in the study. All patients/parents were informed, and consent forms were obtained before attending the study.

After the initial examination, the subjects received exclusively professional guidance on oral hygiene with a combined technique (Horizontal-Charters-modified Bass) (Bok & Lee, 2020) 10 days before the baseline examination (Alves de Souza et



al., 2008). They were supplied with standardized toothpaste and asked to refrain from any other oral hygiene products and no additional information about oral hygiene (Alves de Souza et al., 2008) for the duration of the trial (Türkkahraman et al., 2005). In addition, they were asked to maintain their routine eating habits (Baka, Basciftci, & Arslan, 2013).

3.2 Questionnaire and Medical record data

To obtain socio-demographic variables included age, gender, and level of education, self-administered questionnaires were performed before tying the SSL and EL (T1). Data from medical record were collected included duration of fixed orthodontic therapy, duration of ligation and follow-up duration.

3.3 Assessment of plaque pathogenicity

Plaque pathogenicity was assessed by staining all tooth surfaces except occlusal surfaces with GC Tri Plaque ID Gel™. After the placement of a lips and cheek retractors (OptraGate, Ivoclar, Vivadent), the gel was applied with a microbrush on all tooth surfaces and left undisturbed for 2 minutes. The tooth surfaces were then gently rinsed for 30 seconds and the plaque color changes were then observed as shown in figure 1. The original dark blue color changed to light blue when the pH in the plaque was less than 5. Immature and mature plaque turned pink and purple, respectively (Brostek & Walsh, 2014). The color stained plaque was scored separately. Based on the color changes on tooth surfaces, the plaque maturing staining (PMS) was obtained by using the formula:

$\% \text{ PMS} = \frac{\text{number of tooth with each colored plaque} \times 100}{\text{total number of teeth examined}}$ as previously described (Widhianingsih & Koontongkaew, 2021).

Figure 1

The plaque color changes in an orthodontic patient. Acidogenic plaque as Light blue stain. Mature plaque is presented as a dark purple-blue stain and immature plaque as pink stain.



3.4 Interventions

An experimental study design was adopted for this comparative study. Independent variables included ligation types as interventions. Dependent variables were plaque pathogenicity. A total of 70 patients were randomly selected with a 1:1 allocation rate. Simple randomization was performed using sequentially numbered, opaque, seal envelopes (SNOSE) to ensure equal number in each group (Doig &



Simpson, 2005). Finally, the patients were randomly divided into two groups for intervention: Group 1, SSL group ligated with stainless steel ligature (0.010 inches stainless steel wire ligature ties, Highland Metals™, IL, USA) and group 2, EL group ligated with elastomeric rings (Dyna stick, elastomeric ties, DynaFlex company, St. Louis, MO, USA).

Dental plaque staining was performed at four weeks later. All parameters were evaluated by a single calibrated operator (T.S.).

3.5 Data analysis

Data analysis was done using Statistical Package of Social Sciences (SPSS) version 25 (IBM Corp., Armonk, NY, USA). Assumptions of normality and homogeneity of variance were checked for each variable in order to determine whether to use parametric or non-parametric statistical tests. The normality of sample distribution was assessed by the Shapiro Wilk normality test. Descriptive statistics were presented as mean \pm standard deviation (SD), median, range and percentage. The non parametric tests; Mann-Whitney U test, Wilcoxon signed-rank test and Kruskal Wallis with Dunn-Bonferroni post-hoc test were conducted. The level of statistical significance was set at $p \leq 0.05$.

4. Research Results

4.1 Socio-demographic and characteristic data

Complete data were obtained from 70 patients, of whom 57 were female (81.42%) and 13 males (18.58%). There are between 13 and 53 years [median, 28; mean, 28.87; standard deviation (SD) = 8.3]. Of the 70 enrolled patients, no abandonment was due to adverse effects of the intervention. As shown in Table 1, when separate into 2 groups, each group consisted of 35 patients. The average ages (median and range) of SSL group was 28 (13-43) years, and of EL group was 28 (15-53) years. There were 30 (85.71 %) females in the SSL group whereas 27 (77.14%) females were found in the EL group. More than 50% of our patients (68.57%, SSL group and 74.29%, EL group) obtained the diploma or higher education.

The average duration (median, range) time of orthodontic treatment before participation in this study was 4 (0.5-5.0) years and 3 (0.3-7.0) year in SSL and EL groups, respectively. The average (median and range) follow-up duration was 32 (21-111) days and 30 (21-180) days in SSL and EL groups, respectively. There was no a statistically significant difference between these two groups in terms of age, gender, educational level, duration time of fixed appliance placement before interventions, and follow-up time (Mann Whitney U test, all $p > 0.05$).

Table 1

Descriptive analysis of socio-demographic and orthodontic treatment data according to the ligature types



Variable	SSL	EL	p-value
<i>Socio-demography</i>			
<i>Age (years)</i>			
Mean (SD)	28.06 (7.14)	29.69 (9.15)	0.66 ^a
Median	28	28	
Min-max	13 - 43	15 - 53	
<i>Gender</i>			
Male, n (%)	5 (14.29)	8 (22.86)	0.54 ^a
Female, n (%)	30 (85.71)	27(77.14)	
<i>Educational level, n (%)</i>			
< Diploma	11 (31.43)	9 (25.71)	0.79 ^a
≥ Diploma	24 (68.57)	26 (74.29)	
<i>Orthodontic treatments</i>			
<i>Duration of fixed orthodontic therapy (year)</i>			
Mean (SD)	2.65 (1.2)	2.8 (2.01)	0.08 ^a
Median	4	3	
Min-max	0.5- 5.0	0.3 - 7.0	



Follow-up duration (T2, days)			
Mean (SD)	37.77 (16.59)	38.89 (27.69)	0.48 ^a
Median	32	30	
Min-max	21-111	21-180	

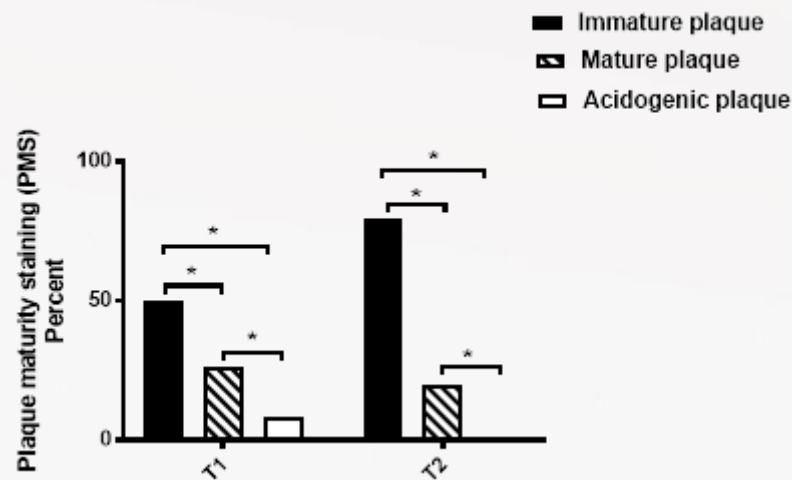
^aMann-Whitney U test

4.2 Plaque pathogenicity

In the SSL group, at T1 the percentage of immature plaque (median = 50%; range = 8 -100%) was highest when compared to mature plaque (median = 26 %; range = 0 - 84 %) and acidogenic plaque (median = 8%; range = 0 - 54.54%) ($p = 0.00$, Kruskal Wallis with Dunn-Bonferroni post-hoc test) (Figure 2). At T2, the percentage of immature plaque was statistically increased (median = 79.16%; range = 16.66 -100 %) ($p = 0.00$, Wilcoxon signed-rank test). In contrast, the percentage of mature plaque (median = 20 %; range = 0 -70.83 %) and acidogenic plaque (median = 0%; range = 0 - 40%) was decreased with a statistically significant difference ($p = 0.00$, Wilcoxon signed-rank test). Furthermore, Kruskal Wallis with Dunn-Bonferroni post-hoc test indicated significant difference in all pair- wise comparison at T2 ($p = 0.00$).

Figure 2

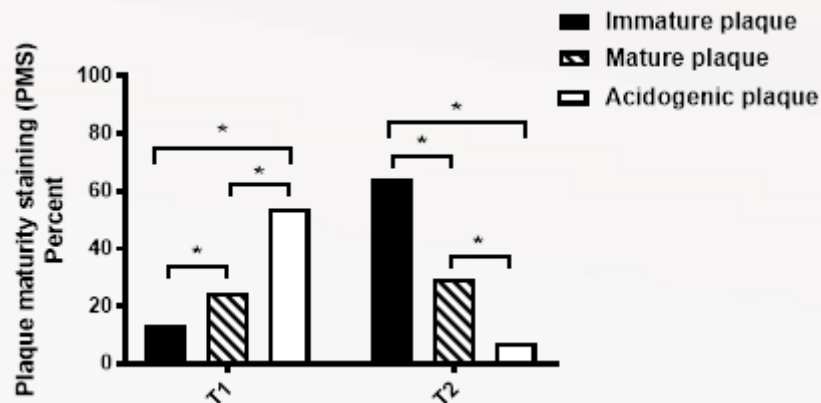
Frequency distribution of plaque maturity in the SSL group over the study. Dental plaque staining was performed after SSL ligature tying for 30 (25-44) days (T1) and 32 (21-111) days follow-up. Statistical tests were performed by Kruskal Wallis with Dunn-Bonferroni post-hoc test. The asterisk denotes $p < 0.05$ between indicated groups.



In the EL group, figure 3 shows that at T1, the highest percentage of acidogenic plaque (median = 54.16 %; range = 14.81-100 %) in this group while the percentage was 25.0% (0 -70.83%) and 13.63 % (0-60 %) for mature and immature plaque, respectively ($p = 0.05$, Kruskal Wallis with Dunn-Bonferroni post-hoc test). A decrease in acidogenic plaque (median = 7.14 %; range = 0-50 %) was observed at T2 whereas an increase in immature plaque (median = 64%; range = 16.7-100%) was detected (all $p = 0.00$, Wilcoxon signed-rank test). However, there was no a statistically significant difference in mature plaque (median = 29.6%; range = 0-70.83%) ($p = 0.54$, Wilcoxon signed-rank test). Comparison of plaque maturity showed that the highest percentage of plaque maturity was observed in immature plaque, followed by mature and acidogenic plaque at T2 ($p = 0.05$, Kruskal Wallis with Dunn-Bonferroni post-hoc test).

Figure 3

Frequency distribution of plaque maturity in the EL group over the study. Dental plaque staining was performed after EL ligature tying for 30 (21-62) days (T1) and 30 (21-180) days follow-up. Statistical tests were performed by Kruskal Wallis with Dunn-Bonferroni post-hoc test. The asterisk denotes $p < 0.05$ between indicated groups.



5. Discussion

To apply the ecological plaque hypothesis, we used the 3-tone disclosing gel to determine plaque maturity. However, the ecological plaque hypothesis not only targeted specific bacterial species, but also targeted the factors that resulted in the environmental change of the plaque. According to determinants – confounders’ model in dental caries, socio-demographic characteristics are confounders of dental plaque and caries formation (Usha & R, 2009). Therefore, these confounding factors should be controlled in randomized controlled trial. It should be noted that in this study, no statistically a significant difference in sociodemographic characteristics, duration of orthodontic treatments and follow-up duration between SSL and EL groups. This indicated that in the present study all mentioned confounders were well controlled in both experimental groups.

Fixed orthodontic therapy generally causes retentive sited associated dental plaque accumulation (Raju et al., 2013). Elastomeric ring and ligature wire are the two commonly used techniques for typing archwires. Investigation done by Forsberg *et al* (Forsberg et al., 1991) demonstrated that a higher level of acid producing bacteria, particularly *Streptococcus (S.) mutans* and *Lactobacilli* on EL ligature compared to SSL for 12 orthodontic patients. In contrast, Tukkahraman *et al* (Tukkahraman H et al., 2005) found no significant difference in the numbers of *S mutans* and *lactobacilli* from teeth ligated using similar methods, with either stainless steel or elastomeric rings.

The present study evaluated dental plaque accumulation using GC Tri Plaque ID Gel™ which provided not only plaque accumulation but also its maturity. Therefore, our findings were in line with Forsberg *et al* as we found higher the percentage of acidogenic dental plaque in the EL group compared with the SSL group. This difference is certainly due to an increase in retentive areas of elastomeric rings compared to stainless steel ligature (Raju et al., 2013). However, this result is in contrast with results of Rodrigues *et al.* (Rodrigues, de Araujo Ramos Sales, Vitral, Fraga, & Quintao, 2011) who reported no difference in dental biofilm index between the surfaces tied with SSL and EL.



In addition, elastomeric rings are considered an organic material in their composition which might be more favorite for bacterial colonization than stainless steel, which is an inorganic material with an inert material surface (Harikrishnan, Subha, Kavitha, & Gnanamani, 2013; Sawhney, Sharma, & Sharma, 2018). Furthermore, patients, who undergo orthodontic therapy have oral ecologic changes, such as a low pH environment, which may lead to increased plaque pathogenicity. It was found that early in orthodontic treatment, EL had a significant effect on salivary pH compared with SSL ligature, lowering it to unfavorable levels (Al-Haifi, Ishaq, & Al-Hammadi, 2021).

According to our findings and previous studies, the effect of ligature types on dental plaque accumulation is confirmed. The results of the present study suggested that ligature type has significant effect on ecological environment of dental plaque deposited on orthodontic appliances. Increased retentive areas and organic material in nature play important roles for an increase in plaque pathogenicity in patients with elastomeric rings.

A specific 3-tone plaque disclosing dye can help orthodontists identify rapidly where patients are struggling with mechanical cleaning. Being able to see the metabolic activity of the dental plaque in individual sites empowers orthodontists and motivates orthodontic patients, as both can now converse about the issues shown by a 'real-time' assessment of fermentation. By the patients then demonstrating adequate plaque removal and a suitable recall period can be set to allow timely monitoring (Brostek & Walsh, 2014; Walsh & Healey, 2019).

Looking into the future, there are prospective for better monitoring of oral hygiene and caries prevention during orthodontic treatments. Moreover, it is efficient methods of assessing patient compliance and a cost-effective procedure (Al-Haifi et al., 2021; Ghijssels, Carels, & van Gastel, 2015; Turkkahraman H et al., 2005).

6. Conclusions

The ecological changes in dental plaque were observed in patients wearing fixed orthodontic appliances. Acidogenic plaque was statistically higher in the patients with elastomeric ligature compared to stainless steel ligature.

7. Recommendations

Taken together our findings and previous studies suggested that the elastomer as ligature material should preferably not to be recommended in orthodontic patients with high caries risk or inadequate oral hygiene practice. Our results suggest that the 3-tone plaque disclosing gel is convenient and also valid to assess caries risk and monitoring patient compliance. Although our findings have successfully demonstrated effect of SSL and EL on dental plaque maturity, this study has certain limitation. Blinding of the investigator and participants was not feasible. The current findings might be contaminated with previous orthodontic treatments before enrolling in the



study. However, in this study the short-term effect was focused. Therefore, the long-term effect was recommended in further study.

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Competing interest

The authors used the 3-tone disclosing gel in this study, but does not have a commercial interest in this product. The authors declare that they have no commercial or associative interest that represents a conflict of interest in connection with the manuscript.

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ABSTRACT



Quality of Life of Students in Health Professions in the Situation of Corona Virus 2019 Pandemic, Thailand: A Case Study of Public Health Students, Faculty of Science, Buriram Rajabhat University, Thailand.

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Abstract

The Covid-19 pandemic has overwhelming health care systems around the world. The Covid-19 affects many dimensions such as economy, society and education. So that the covid-19 also affects behavior in University students and Lecturers. So, this study emphasized on explanation of quality of life in University students and related risk factors under outbreak of covid-19 period. The observation of this study investigated in students of Public Health program. Faculty of Science, Buriram Rajabhat University. This research was conducted during the situation of Corona virus 2019 pandemic in Thailand. The sample group consisted of 83 out of 350 Public Health students and they were obtained by cluster random sampling. The research tool was The World Health Organization's quality of life indicators, abbreviated version, Thai version (WHOQOL-BREF-THAI). Obtained data were analyzed by using descriptive statistics: frequency and percentage and inferential statistics (Fisher's Exact Test) through SPSS version 23.00. Our finding showed that about one-half of the students (50.61%) had a high level of quality of life. Based on components of each aspect, more than one-half of the students had a high level of quality of life on the basis of mind and social relationship (60.24% and 55.42%, respectively). However, more than one-half of the students had a low level of quality of life on the basis of environment and physical health (60.24% and 55.42%, respectively).

In the crucial outcomes of this studied already show the covid-19 already affect to study behavior of the students, however the student can survive with new normal life. When comparing of each factor the following were found: female had body mass index which was thinner than the threshold (less than 18.5 kg./m²); a moderate level of learning achievement (2.55-2.90); living in a dormitory off-campus; parents were married; main occupation of parents were farming with a monthly income of 8,001 baht and above; parents had better overall quality of life; and only the body mass index factors was relate.

Keywords: Quality of Life, Student, Corona virus 2019



Impact of Periodontal Intervention on Local Inflammation and Periodontitis: Phenomenon and Integrative Treatment

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Abstract

We evaluated the clinical periodontal and inflammatory outcomes of adjunctive minocycline in patients with both periodontitis and type 2 diabetes mellitus (T2DM). Sixty patients with T2DM diagnosed with periodontitis were recruited and divided into control and test groups. All participants underwent a single-visit subgingival ultrasonic debridement, but only the test group received adjunctive sustained-release minocycline gel immediately afterward. Periodontal parameters, cytokines (IL-1 β , IL-6, TNF- α , MCP-1), adiponectin, and *Porphyromonas gingivalis* (*Pg*) antibody were measured at baseline and 3 and 6 months after treatment. The results revealed that the patients in both groups showed significant improvement in all clinical parameters after three and six months. The mean probing depth reduction and clinical attachment level gain after three months were significantly improved in the test group compared to the control group (* $p < 0.05$). IL-6, TNF- α , and MCP-1 were significantly reduced at the 3-month visit in both groups. Adiponectin was significantly increased at 6 months only in the test group. Moreover, *Pg* antibody was significantly reduced in both groups. In conclusion, subgingival ultrasonic debridement combined with locally administered minocycline gel was effective in improving periodontal and inflammatory parameters in patients with T2DM.

Keywords: Minocycline gel, Periodontitis, Subgingival ultrasonic debridement, Type 2 diabetes.



The Study Factor and Exercise Behavior of Buriram Rajabhat University Students

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Abstract

Thailand has been diagnosed with non-communicable diseases and other diseases. Distributed widely among students, increasing steadily. The students had less exercise behavior. Affecting health in every dimension. So, this study emphasized on factor and exercise behavior of Buriram Rajabhat University students. The samples consisted of 400 regular semester Buriram Rajabhat University students. Using an stratified random sampling selection method. The research instrument was the questionnaires developed by the researcher, tested its quality of which the results were excepted. The statistics used in the research were frequency, percentage, mean and standard deviation. The research results revealed as follows: 1) Student information, most were female, 54.25 percent, mostly aged 20 - 22 years 64.5 percent, the majority weighed an average of 51 – 60 kg. 46.5 percent, the majority of the faculty of education accounted for 27.5 percent, the majority of whom were studying in year 2. 3 9 percent, the majority of them living in non-university dormitories 76.25 percent, the majority of the accommodation traveled from the accommodation to the university in 1 - 5 kilometers. 73.25 percent, the majority of people traveling by motorcycle accounted for 94 percent, the majority of whom did not have the disease. 89.75 percent, 2) Overall exercise knowledge factor at a high level accounted for 73.25 percent, 3) Attitudes factor about exercise habits overall (\bar{x} = 3.23, S.D. = 0.72) 4) The overall information receiving factor was at a high level. (\bar{x} = 3.13, S.D. = 0.72) and 5) The overall exercise behavior was at a high level. (\bar{x} = 3.22, S.D. = 0.77).

So, values should be created and a policy on health promotion through physical exercise should be established for students and personnel in Buriram Rajabhat University.

Keywords: Factor Behavior Exercise